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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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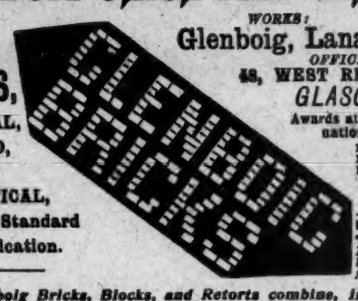

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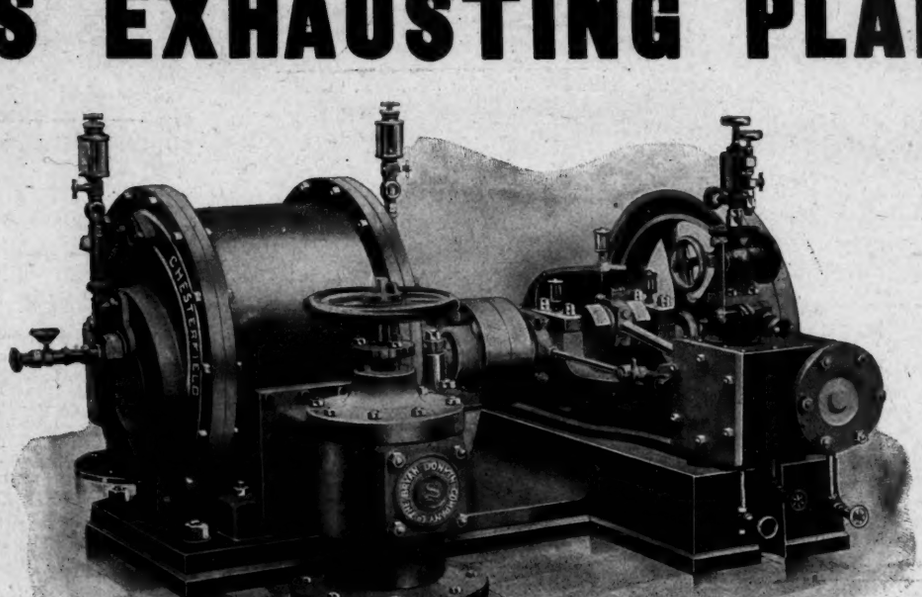

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXL., No. 2838.] TUESDAY, OCTOBER 2, 1917. [69TH YEAR.

EDITORIAL NOTES.

Damaged Gas Capital.

IF a little hustle is required in connection with the obtaining of relief for gas stockholders from the unjust operation of the sliding-scale in current circumstances, perhaps a clause in the new wages increase agreement with the coal miners will give it. What the coal miners have secured in the way of war increase in response to their agitation for a 25 p.ct. advance is stated in a paragraph succeeding the editorial articles. Hard upon the announcement as to the agreed advance comes a prediction by one mining authority that the colliery owners will ask for 2s. 6d. per ton addition to the 4s. standard excess upon the pre-war prices. When they do will be the time to challenge the righteousness of the 2s. 6d. But that the Coal Controller anticipates a movement will be made to obtain an increase of the standard excess price is seen by this clause in the agreement with the miners: "This advance is to be regarded as a special war "wage, intended to assist in meeting the increased cost of "living, and is given on the understanding that any increase "in the selling price of coal shall not operate to secure a "further advance of wages under the wage agreements "in the various districts, unless the increased selling price "shall warrant an advance beyond the special advance now "granted." This is a portentous clause; and most coal contracts contain a provision for an amendment of the contract price in the event of any adjustment for any reason of the standard excess price. Visions rise up of a still further advance of the price of gas, and of a still further decline of sliding-scale dividends. We do not like the aspect of things; and the more irritating becomes the delay that has taken place in seriously dealing with the question.

Already the actual damage to gas capital occasioned by the operation of the sliding-scale under war conditions, and by the procrastination of those upon whom the responsibility rests of making a move, has been of heavy amount; while the damage to the reputation of the gas industry as a source of safe investment is incalculable. In the "JOURNAL" for Sept. 18, we published, in the first editorial article, the results of an investigation into the standard and maximum prices of the statutory companies of the United Kingdom; and roughly judging from the amounts of the standard prices (admitting, of course, that numerous factors came in that could not be treated upon within the limits of a single article), we showed that the number of sliding-scale companies who should first have consideration was not so formidable as one might have supposed. Now in an article on "Sliding-Scale Injustice" in other columns, the author carries the investigation much farther, and indicates, by calculations that are highly valuable both as a contribution to the discussion and as an incentive to action, the immense amount of capital of gas undertakings in England and Wales that must now be receiving dividends below the standard—affording another proof that generalization without investigation is unsafe in a matter of this kind. In the first place, the article shows that 68 p.ct. of the gas sold in England and Wales is furnished by statutory companies, and that of the total capital required to do this, 75½ p.ct. comes under the sliding-scale provisions, representing a nominal issued share capital amounting to £53,028,056. Or if we take the paid-up share capital (including premiums), it is found that, although the number of maximum price gas companies (247) is nearly equal to that of the sliding-scale companies (252), the former is only responsible for 24½ p.ct. of the capital, and that in all but few cases the maximum prices are at such figures that, even in present circumstances, prices can be charged that will enable the maximum dividend to be paid. Another thing (preliminary to the main lesson of the author's statistical research) with which the article impresses us is the fictitious character of the application of the so-called theoretical principles on which standard prices are supposed to be fixed; for if these principles were or could be truly applied, even with the from time to time variation of market and other conditions, there should not have been such a remarkable difference as there has been in the yield of dividend resulting from pre-war prices, and there should certainly not have been such a divergent margin between standard price and the 1913 selling price as, at the top of the scale 3s. and at the bottom of the scale *minus* 8*d*. There is sufficient matter in the article on p. 15 for claiming a very complete investigation into the terms and operation of the sliding scale, however much in normal times we admire the principles underlying it.

As to the principal lesson of the article. We have seen that, deducting premiums, the nominal sliding-scale gas capital in England and Wales is £53,028,056. Now, if the reader looks at the tabulated statement in the article, he will see the datum line which represents standard dividend. If from this he slides a strip of paper or a rule up the table, he will ascertain at a glance the part of the capital of £53,028,056 which has become submerged below the standard dividend with every penny increase in the price charged, and conversely the amount of capital out of the total left in enjoyment of some accretion to the standard dividend. For example, let us assume, as our contributor does, that the net war burden averages 1s. per 1000 c.ft. The table shows that, under the sliding-scale, an increase in the selling price of 1s. per 1000 c.ft. would submerge below the standard dividend no less than £42,324,036 of the sliding-scale capital, and leave only £9,105,122 receiving more than the standard dividend. The article has succeeded in showing in a very simple way the present-day effect upon capital of what is termed the "erratic sliding-scale system." We have been piling-up the hard facts in support of an appeal for justice to the powers that be. This statistical demonstration of effects surely crowns the case; and it, with the fresh clouds within immediate view, urges that the matter of relief should be hastened. "In the law of production and distribution, "the burden passes on;" but it is only in the sliding-scale governed part of the gas industry that the capital is denied fair recompense when the burden assumes an inordinate character.

Some Lessons from War Experiences.

IN the "opening" for the discussion upon the wartime experiences of gas undertakings which the new President (Mr. J. H. Brearley) prepared for the meeting of the Eastern Counties Gas Managers' Association last Friday, there appeared these words: "It is appropriate to search the experi- "ences of the past three years, the better to meet the urgent "needs of the immediate future, and the not less vital days "that lie beyond." As we read these words, the hope was aroused that their meaning was that Mr. Brearley was going to extract and show how to apply the lessons of the wartime experiences to guide the actions of his colleagues and the industry generally in regard to the immediate future, and the highly vital days lying beyond. This apparently was not his intention, and to that extent there is disappointment, though the survey made of the present conditions of the industry (so well known to every responsible executive official) was excellent in that it was admirably complete in a comparatively short space, and just the thing to induce men

who have passed through the hardships imposed by the war —hardships increased by new obligations and the rulings of the higher powers all in the national interests, if not wholly so in those of the gas industry—to unburden themselves as to their individual experiences and opinions upon the maze of intricate happenings that have befallen them.

As Mr. Brearley remarks, it is a matter for congratulation that the gas industry has little to reproach itself with in connection with the memorable period which has elapsed since August, 1914. If the history of the war is faithfully written, it will be recorded that the industry loyally did its part for the country in the matter of supplies both for prosecuting the war and for increasing the food supplies of the nation. The industry has shown a remarkable capacity for meeting emergencies. It has been successful all along the line; and though financially it has been hit hard, and unjustly so, it can pride itself upon, in all the adverse circumstances, having maintained the integrity of its undertakings, and advanced its material credit in a no inconsiderable degree. So far good. But the best and most powerful of ships have sometimes been driven on the rocks through culpable negligence. We must not blind our eyes to the future by the (if not among investors) high credit in service which the industry rightly at present possesses. Mr. Brearley speaks of it as being unthinkable that such unstinted services as the industry has rendered will not in due time receive their reward. It is unthinkable. But the industry is at the present time living under a form of artificial protection created by the war. Its competitors both at home and abroad are limited in their operations for the same reasons that the gas industry is. Much of the large service to the community just now is due to war conditions. Part of the extraordinary increase in gas consumption is so; the fulness of coke sales is also attributable to the same circumstances; the home demand for sulphate of ammonia (albeit the unreasonably low fixed price) is due to the same causes; so is the extraordinary demand for certain liquid products, though we see fields for their profitable utilization hereafter. All the artificial protection that war influences and needs have conspired to bring about will be broken down after the war. What then?

Only the other day, we were reading the utterances of a patriotic gas man who advised that we should concentrate our whole thought and energy upon getting through the war, and at present pay less attention to what is likely to happen afterwards. In respect of the major affairs of life, sane men are always taking thought for the morrow. It is unthinkable, remarks Mr. Brearley, that what the industry is doing to-day will not in due time receive its reward. From what source? The influences of all this work, so far as example and experience go, will undoubtedly bear good, and progressively abundant, fruit in the future. But some men have short memories. The Government and Parliament, however grateful they may be to-day, may not allow their gratitude to express itself in action after the war, without action is stimulated from within the industry itself. The industry's competitors will not hold what the gas industry has been doing during the war as any reason why they should not utilize after the war all the forces they can devise to place themselves in a better economic position for attacking the industry; and in all those branches in which the industry sees development in respect of its residuals, there are private interests that will endeavour to block the way, and inappreciative legislators who will, with the affection they have for precedent, desire to maintain the barrier of restriction across the path of progress. The "reward" for present services will not be great, unless the industry itself moves actively in securing it. The war has illustrated that the industry has a fine capacity for meeting emergencies; it has taught us that there is much in the industry that was latent and quite hidden before the war. It has evidenced, too, that we must be strongly organized and co-operatively active if we are to push our advantages along to the best of ends. The industry entered the war without a fully representative head and front. We know the folly of it now; and it must never revert to the condition again. The first great lesson of the war for the industry is preparedness for what Mr. Brearley has called the "vital days that lie "beyond." There can only be preparedness by the vivifying influences of strong organization and real co-operation, and death to procrastination and indifference.

Among the constructive work that is before the industry is the rehabilitation of its financial reputation. Mr. Brearley estimates that in the case of joint-stock gas capital alone, the depreciation of market value is equal to the enormous sum of 30 millions sterling. Without making an approximate check, we are not surprised by the amount. We know the causes: The high value of money, diminished dividends, the reduced purchasing power of these dividends, and the heavy income-tax to which they are subject. An endeavour should have been made long since to have averted some part of the depreciation due to reduced dividends. Now, and only now, that great harm has been done, now that the outlook suggests that there will probably be in some cases further reductions of dividend, now that some companies are standing on the threshold of a further decline in the market values of their stock, a really serious effort is going to be made to defend from greater sacrifice those who so confidingly entrusted their money—their "all" in some instances—to the gas industry. The financial rehabilitation of the industry, however, will be the more difficult on account of the changed circumstances—not only internal, but external to the gas industry. The War Loans carrying (for securities backed by the Government) a high rate of interest have put quite a new complexion upon what is a fair return for commercial securities, subject to the vagaries of markets and of demand, and investors will in future look to the two points of return and safety before placing their money. Tempting offers will consequently have to be made by the industry, whose capital charges per 1000 c.ft. are important in the making of the price at which it can sell its commodity. Is there no lesson in this—a lesson which calls upon the gas industry to ensure that it has a completely representative body that will actively look after the interests of the industry, and a body that is not bound by individual predilection or interests? A body, too, that, through its strength, can help the weak. This matter of the sliding-scale is a complicated one. Necessary revision of standard price only affects some companies; and some of the companies whose standard prices require revision are companies who have been in the habit of charging low prices for gas, and carrying forward small balances—looking upon the low price charged as a good reserve. What happens in their case? Mr. Brearley says that "no fair-minded person "can quarrel with the efforts to put down profiteering, or the "fixing of an excess profits tax." There are some companies with a low average of gross profit for the years taken to ascertain their normal profits who would, if only they made enough gross profit now to pay interest and dividend—the interest including the considerable sum that has had to be borrowed from the bankers at war rates so as to "carry on," and for the immense stocks which have to be provided at the works for winter use—come under the excess profits tax, owing to their good treatment of the consumers in the past, while others who formerly had substantial sums as balance-forward would escape. There is thus more to be legislated for than the standard price. Some maximum price companies and local authorities have their own particular matters for adjustment. There are lessons here as to a greater financial flexibility being wanted in the sliding-scale and other matters.

It is obvious that, after the war, owing to the Treasury restrictions, the necessity for works extensions, and present dearness and shortage of material and labour, a large amount of money will be required. Mr. Brearley points to the probability, which amounts to a certainty, that money will remain dear for a long time after the war; and it seems to him that, bearing in mind the indispensability of the gas industry, a suitable solution of the problem of economically providing the money would be afforded by Government loans to gas undertakings, whether belonging to companies or local authorities. We rather think the Government will be pretty well engaged after the war in clearing up the mess caused by the prodigious international upheaval, and will not want to enter into fresh financial commitments other than those that are absolutely necessary. And water undertakings, railway companies, electric supply concerns have, among others, their indispensability. Why not Government loans for them, too, and to others? Another lesson of the war is the provision by gas undertakings of good reserves, and not their neglect.

The war tale is almost an endless one. Mr. Brearley speaks of the change in the summer and winter percentage of coal deliveries. Those who know what it is to be within days and hours of running out of coal and gas do not trouble now about percentage deliveries. They simply thank goodness, whatever the subsequent cost of handling, when they can see stocks growing. A good coal stock, in view of possible labour difficulties, is a lesson which can be extracted from the war experiences. References by Mr. Brearley to

bad coal picking at the colliery belts, to the use of artificial oxide in purification, to the employment of women and their wonderful adaptability, to the composition and consumption of gas, to the washing of gas, to the present position of sulphate of ammonia, all contain, if one looks for them, lessons for the future—particularly in respect of residuals. There will be great opposition and great competition in this quarter. It behoves the gas industry to be prepared. Large works all over the world have been set up in connection with the extraction of nitrogen from the atmosphere and the provision of nitrates for explosives making and for use later as fertilizers. The opportunities for export trade in fertilizers will in consequence be greatly reduced ; the competition for what there is left in the way of demand will be greatly increased. Let us not harden ourselves to the exclusion of facts; but let us act to the best of our ability on the lessons that are boldly set before us by the actual conditions. The industry has proved its capacity, has proved its inherent strength, has proved that the best policy in shaping its course is by united action and co-operation. Individual undertakings, no matter how wise the administrations, are not alone strong enough to fully and sufficiently deal with the problems of the present and the future, and the forces that will be brought against the industry. It is the business of the strong undertakings, in their own as in the general interests, to see that the weakest spots in the industry are strengthened by their support, and that the opponents of the industry secure no advantage in these directions. It is the duty of the whole industry to ensure that no effort is spared, no opportunity lost, to strengthen its general position. There is plenty of work and a big task here; and duty bids us look forward.

Deficient Data and Metal Melting.

It is to be regretted that the readers of papers on the melting of metals at the recent meeting of the Institute of Metals —papers advocating particular methods—did not precisely know a little more regarding the capabilities of other systems, and so did not give them full credit. Apart from the opportunity which this deficiency offers for criticism, it is at least misleading to those who have not the experience or the data available with which to make comparison on their own account, and consequently much harm may be done. While we are all for progress, it is better to make sure of our grounds before pronouncing condemnation, or giving to any system a larger margin of advance over others than that which can be demonstrated as true. Take the paper by Mr. L. C. Harvey, treating of fuel economy possibilities in brass-melting furnaces. The case that he presents shows disadvantages and losses greater in the case of all systems other than the one that he particularly favours. In metal melting, comparison on the thermal basis of fuel used is a stunted method. But this is what Mr. Harvey's paper practically amounts to. He merely takes the pit crucible furnace and the crucible tilting-furnace and compares coke, powdered coal, town gas, and producer gas—showing the quantity of British thermal units of the original coal that is usefully employed in brass melting, and he calls the other (less coke) waste—placing upon the usefully employed coal and the "waste" certain total values at given prices per ton. A gas engineer need not be told, although the layman has not the advantage of his knowledge, that it is impossible to take the thermal efficiency of a ton of coal (powdered or solid) as used in a suitable form of melting-furnace, and compare it with the thermal efficiency obtained by the same ton of coal using only the gas and coke realized by its carbonization in gas-works. The tale does not end there. The work of a manufacturer of town gas does not finish with the gas or the coke. The tar yielded by the coal has a considerable thermal value; and, if distilled, the different grades of oils have not only a high thermal value, but are of great use for power purposes. Other of the products are of immense importance in many directions. The sulphur realized is useful for sulphuric acid making; the cyanides have their value; the ammonia recovered is valuable for the production of sulphate of ammonia or other purposes. There is little waste from the ton of coal carbonized on a gas-works. But Mr. Harvey told the Institute of Metals of none of these things; and he gave the gas-works process no credit for anything from the ton of coal, other than gas and coke, nor made any particular recognition of the cleanliness, power of regulation, low losses by radiation, and the small space occupied by the gas-furnace, and the little labour required by it. Mr. Harvey has much to make good before his paper can be accepted as being the last word in the comparison. The "waste" of the carbonizing system is not as represented by him, and the comparison is altogether vague and incomplete; so much so that it would require the writing of a paper of considerable length to amend his contribution, and remedy its deficiencies.

Among the deficiencies is omission of data to make the case good for his favoured system of the use of powdered coal with the crucible tilting furnace. Next to this he has a fancy for the use of producer gas for large furnace installations. Mr. Harvey regards the powdered coal system (which is destructive of so much that is recovered by the gas-works process) as an ideal one, as it results in no loss of heat prior to the burning in the furnace. And yet the best efficiency he can claim is 15 p.ct., which improvement appears to be as much due to the furnace as to the powdered coal. But there is here an obvious omission from the paper. The coal has to be powdered. Therefore a grinding-machine is required; and the machine needs power. The powdered coal also necessitates some form of pressure to deliver it through the burner to the furnace. All this means capital charges and depreciation and working expenses in preparing the fuel for use. What are these charges? They may not be large per ton of coal ; but the engineer has to take into account every item that goes to make up the total. With town gas, which is delivered to the furnace merely by turning a tap, all charges from the purchase of the coal, its storage, and its treatment up to the point of the delivery of the powdered material to the furnace are eliminated. When the powdered coal reaches the furnace, the one thing that can be said in its favour over solid fuel is a more rapid and complete combustion ; other than that, with powdered coal the disadvantages of the use of unpowdered coal will be there with all their glorious uncertainty, *plus* the troubles which attach to coal in the powdered form. If the delivery nozzle reaches a temperature sufficient to intumesce the powdered coal, some stoppages may be anticipated; and this would mean care in choice of coal used. A highly bituminous coal, such as the Durham, would not in such circumstances be at all desirable. It may also be expected that flue choking may occur; also that there may be a fluxing action of the ash on the refractory linings. Beyond these things, labour is required for dealing with the ash. General considerations such as these show that there is more to be said than is presented in the paper. It was a good thing that Mr. S. N. Brayshaw was at the meeting, to point out that the communication did not tell the whole story of the efficiency of the town-gas process in its utilization of coal and in the use of the gas for metal-melting. It is a good thing, too, that Mr. H. M. Thornton and Mr. Harold Hartley have since sent for publication contributions which we have appended to Mr. Harvey's paper, which will give him food for reflection. With reference to Mr. Hartley's figures as to gas production per ton of coal, he has understated the average in taking 12,000 c.ft. for normal working ; and he has overstated the unaccounted-for gas in putting it at 10 p.ct. The tar and sulphate of ammonia, too, are rather in excess of the normal average working ; but, in this connection, we should like to point out to Mr. Harvey that it is possible to utilize the coke in a blue water-gas plant for the making per ton of between 50,000 and 60,000 c.ft. of gas of 300 B.Th.U. So that, if our 12,500 c.ft. of gas gives us 6,875,000 B.Th.U., and the half ton of coke available for sale from the ton of coal will give us 9,000,000 B.Th.U. in the shape of blue water gas, we get 15,875,000 B.Th.U. in the gaseous form, without taking into account the thermal or other value of the tar and the value of the other products.

We have before us a fuel balance-sheet drawn up by Mr. Hartley, and based upon the author's own data. This shows that there is little difference between the use of powdered coal and the application of the combustible products of the gas-works carbonization system, both of which appear to be preferable to the producer-gas system, if Mr. Harvey's premises are correct. Mr. Hartley's comparison indicates that the efficiency of 15 p.ct. claimed for the crucible tilting furnace and powdered coal should be 13·5 p.ct., and that on this basis the thermal energy of a ton of coal usefully employed would be capable of melting 15,016 lbs. of brass. Using the coke, tar, and gas from the gas-works process, and furnaces of 15 p.ct. efficiency, 13,880 lbs. of brass would be melted. But here we have, in addition, the other secondary products to go to the credit of the gas-works process and as deductions from the cost of the coal, *plus*

the savings prior to the delivery of the powdered coal to the furnace and the labour required for cleaning and maintaining in working order afterwards. As to producer gas, assuming a 75 p.ct. producer efficiency, and utilizing, in addition to the gas in a gas-furnace, the tar in an oil-furnace, Mr. Hartley calculates that the gas and the tar together would be capable of melting 10,187 lbs. of brass, in which case there would be as a credit 85 lbs. of sulphate of ammonia, which is a pretty high figure for an average even in Mond producers and utilizing large volumes of steam. Here we must leave the matter; sufficient having been said to show that, in the cause of exact comparison and fair presentment of relative cases, there was much wanting at the recent meeting of the Institute of Metals.

A Further Contrast.

In the editorial in last week's "Journal," headed "A Contrast," we spoke of the straits in which German gas-works are in comparison with the British gas-works in the matter of coal supply. A short article in another part of the same issue showed that the grip of those straits was tightening, though winter is approaching. While stacks of coal are growing in height and girth in British gas-works, many of the German works are being fed comparatively by the teaspoonful. Although we are now in October, there are German works that do not know, and have not had the pleasure of knowing, what it is to have more than a week's supply in store, and frequently much less. Their prospects are not promising for the winter. Still the engineers must be grateful that the Imperial Commissioner for the Distribution of Coal has awakened to the perilous condition of gas-works; and for a month (whether it is being continued we do not yet know) he did precisely what Herr E. Körting, at the recent meeting of the German Association, advised should be done. He reduced by 6 p.ct. the normal output of coke-ovens, in order to release 200,000 metric tons of coal extra for the supply of gas-works. Under the circumstances, this amount will not go far; and the future certainly looks black.

The Gas Consumer's Complaint.

That a little knowledge is a dangerous thing is well exemplified by the complaint of a gas consumer, reproduced from the "Daily Telegraph" in the last issue of the "Journal" [p. 571], and we are rather astonished that the "Engineering Correspondent" of that paper, if the communication came under his observation, allowed it to appear without comment. The gist of the complaint is that, in providing for the requirements of the war in the matter of high explosives by washing gas, no protection has been given to the consumers by the local authorities "insisting that the heating power should be kept at, or near to, the original standard;" and he adds that this is why the inert gas in some districts has risen to as much as 30 p.ct., while in other areas it is only 10 p.ct. The consumer does not appear to be aware that gas containing up to 30 p.ct. of inert constituents may be well above the standard of calorific power per cubic foot, and that gas containing only 10 p.ct. may show a no higher value with the calorimeter. The official testings are instructive on this point during this period of gas-washing for the removal of benzol and toluol. The presence of high percentages of inert constituents in some gases is due in part to the removal of the constituents required for high explosive purposes; but, where the percentages run high, the increase is chiefly due to the desire to maintain the production of gas per ton of coal, under the adverse condition of a larger percentage of inert material supplied at this time in the coal. We do not defend the practice; it is wrong. And the "Journal" has been consistent in exposing the practice in the interests of the industry, more especially in view of the known movement for its suppression. Where the complaining consumer is at fault is in imagining the cause of his grievance is necessarily owing to a material depreciation of the calorific value of the gas per cubic foot. It is perhaps due (we cannot definitely say on the vague statements in his letter) to the depreciation of the flame temperature of the gas owing to the presence of an excess of inert constituents. Or it may be due to his neglect to properly regulate his burners. He appears to know that the air supply requires adjusting to produce the complete combustion of the gas; but he complains that no advice to this effect has been given. If he has been careless, this may partly account for the 75 p.ct. increase in his consumption, although we cannot understand how, if the use conformed with the corresponding period of 1915, so great a volume of extra gas could have been consumed even under the worst of conditions. The extent of the knowledge of the complaining consumer is further evidenced by his statement that "at times also the pressure has been low, so one did not get the same mass of gas in 1000 c.ft."! It would have been well, in publishing this complaint (with its peculiar statements) in the public Press, to have pointed out that, however unintelligently some of the points were made, the complaint has not universal application.

Miners' Wages.

We may anticipate that, now the Coal Controller has got rid by a compromise of the difficulty of the miners' application for a 25 p.ct. advance of wages, the coal owners will try to obtain an increase of the standard excess price of 4s. per ton. This has been threatening for some time; and now the opportunity, we may anticipate, is too good to be lost without making an effort. The first offer by the Coal Controller was 1s. 3d. per day to all workers of 18 years of age and upwards, and 7½d. to youths. But the Miners' Federation rejected this, while accepting the principle of a flat-rate increase to all workmen alike, though it introduces a new principle into the coal industry. In consequence of this, after consultation with the Government, the Coal Controller increased the proffered advance to 1s. 6d. to those over 16 years of age, and 9d. to youths. This has been accepted. The reduction of the age limit by two years, it is estimated, will raise the number of workmen obtaining the 1s. 6d. to 900,000, leaving 100,000 youths to receive an extra 9d. a day. Calculating that the increase totals to £71,250 per day, for 300 days' work we arrive at the enormous sum of £21,375,000 per annum, as the addition to the miners' wages bill. What changes this will bring in its train remain to be seen.

PERSONAL.

Lance-Corporal Richard Taylor, who, prior to joining the army, was employed at the Chesterfield Gas-Works, has been awarded the Military Medal for bravery in the field. He was wounded in performing an act of gallantry.

The Scunthorpe Urban District Council have appointed Mr. Samuel Moore, of Portrush, as Manager of the gas undertaking, at a salary of £200 per annum, with house, gas, coal, and water. There were over a hundred applicants for the position.

Mr. H. J. Carpenter, who (as mentioned in a previous issue) is leaving Doncaster for Peterborough, was on his departure presented with a chiming hall-clock in oak, and Mrs. Carpenter with an umbrella, by the men, women, and staff, as a token of goodwill and appreciation.

Coke Output in the United States Last Year.

The "Iron and Coal Trades Review" gives some statistics compiled by the United States Geological Survey from returns furnished by the operators. The output of coke in 1916 was 54,533,585 net tons, compared with 12,952,435 tons in 1915. The production of bye-product coke in 1916 was 19,069,361 tons—an increase of 35·5 per cent. compared with the previous year. Bye-product coke represented nearly 35 per cent. of the total in 1916, compared with 34 per cent. in 1915. The number of active bye-product ovens increased from 6036 in 1915 to 6607 in 1916. Six new bye-product coke plants, with an aggregate of 603 ovens, began operations in 1916, and had an aggregate output of 708,485 tons of coke. Every important producing State shared in the increase. Pennsylvania produced 31,279,695 tons of the year's output; Alabama, 4,298,417 tons; Indiana, 3,489,660 tons; Ohio, 1,803,268 tons; Illinois, 2,320,400 tons; Colorado, 1,053,553 tons.

It is reported by the "Engineer" that Pisa is now lit with natural gas; a large supply of good quality having been found some two miles from the town. The shortage of coal in Italy makes the discovery especially welcome. Also it is said that a company called the Hungarian Earth Gas Company is contemplating the erection of aluminium works to exploit the bauxite deposits near its gas springs in Transylvania.

The "Journal des Usines à Gaz" gives particulars of the congress of the Société Suisse de l'Industrie du Gaz, at Interlaken, on Sept. 2. The papers read were: (1) On the Distillation of Wood and Peat, by Dr. Ott, of Zurich; (2) Results of Recent Researches on Coal and their Bearing on the Gas Industry, by Dr. Schlaepfer, the Director of the Federal Laboratory of Research on Fuels at Zurich; (3) A New Apparatus for Economizing Gas, by M. Laquai, of Zurich.

SLIDING-SCALE INJUSTICE.

[Contributed.]

In those teeth-sharpening returns relating to gas trading in 1913 or 1913-14 as the case may be, the sale of gas in England and Wales [omitting inexplicable bulk supplies] is given as 186,016 million cubic feet, of which 68 p.ct. sold by statutory companies necessitated a share capital issue [including premiums] amounting to £76,638,814. Dividing this capital between sliding-scale and maximum-dividend companies we find:

No. of Companies.	Description.	Paid-up Share Capital (including Premiums).	Capital Ratio.
		£	P.Ct.
252 ..	Sliding scale ..	57,755,058 ..	75·4
247 ..	Maximum dividend ..	18,883,756 ..	24 6

Three Classes of Price Restriction.

In municipal undertakings and maximum-dividend companies, price restriction is theoretical rather than actual. All maximum-dividend companies have maximum prices; some municipal concerns have not. But wherever such exist they leave, with few exceptions, ample margin to meet almost any conceivable thing which would have the effect of sending up the price of gas.

The position of sliding-scale companies is altogether different. The incidence of war cost, falling upon all three classes without distinction, produces a similar and general effect; but with sliding-scale companies it is, in addition, penalizing. This arises out of a situation uncontemplated, never experienced in the history of gas, and not likely, we may believe, to recur in the next hundred years. To some sliding-scale companies, the prejudicial effect of this temporary burden on capital proves to be a veritable crown of thorns. Parliament, in its wisdom, has thought fit from time to time to impose standard price in substitution for maximum price—in some cases at an impossible level—and we have known all along that a goodly number in a certain class would, by the force of circumstances, be reduced, comparatively speaking, to the low ebb of poverty and distress.

The real criterion, in these unprecedented times, is not standard price, but rather what it yields over and above pre-war selling price; and the remarkable divergence in margin may be explained by "sting" [or else the want of it] in municipal opposition, rather than to the lack of cleverness in counsel and witnesses. Anyhow, the particular hardship now prevailing may be ascribed to Parliament's former generosity.

This week many have been stimulated by contemporary editorial comment—sagacious and very true. "As time goes on, it becomes more evident that the financial stability of the industry will, by reason of present circumstances, receive such a shaking, if nothing be done, as will utterly defy recovery."

We must, however, draw a clear distinction between capital and revenue.

Precarious Position of Some Sliding-Scale Capital.

The writer is not aware of the existence of any attempt to show, in a simple way, the effect upon capital of an erratic sliding-scale system. Deducting premiums, the nominal sliding-scale capital of the 252 gas companies of England and Wales amounts to £53,028,056. The range covered by the difference between standard price and the highest 1913 selling price to ordinary consumers, in these undertakings, extends from 3s. at the top, down to a *minus* 8d. at the bottom. A chart below gives the number of companies, with share capital in each grade, as well as the respective margins of pre-war selling price, with datum line representing standard dividend. We can thus see, on the basis of the 1913 selling prices, that—

	Nominal Share Capital.
An increase of 8d. per 1000 c.ft. would send below datum	£6,991,861
,, ,, 9d. ,, ,, ,, ,,	30,914,037
,, ,, 10d. ,, ,, ,, ,,	32,213,260
,, ,, 11d. ,, ,, ,, ,,	32,622,516
,, ,, 1s. ,, ,, ,, ,,	42,324,036
And so on, while conversely—	
An increase of 1s. per 1000 c.ft. would still permit of more than standard dividend being paid upon . . .	9,105,122
An increase of 8d. per 1000 c.ft. would still permit of more than standard dividend being paid upon . . .	22,071,532

Who will think of denying the assessment of war's burden at 1s. per 1000 c.ft.?

The Remedy.

Much fancy embroidery has been delicately worked round about the subject, and remedy has been screened by much apparent difficulty, but more real objection.

A temporary remedial measure is now a matter of absolute urgency, and cannot wait. In all the circumstances of the moment, one rule should be applied all round. Such, for example, as:

1. Maximum: Payment of dividends on the 1914 basis; or
2. Minimum: Standard dividend *plus* any accretion which selling price may authorize; or
3. Mean: Standard dividend *plus* any accretion which the selling price may authorize *plus* a percentage of the difference between the whole and the 1914 basis.

Number of Companies.	Having a Margin between Standard Price and 1913 Selling Price of:	And Nominal Share Capital to the Value of:	With Increase of 1d. per 1000 c.ft. in Price.	
			Capital Going Below Datum.	Capital Receiving Above Standard Dividend.
	s. d.	£	£	£
1	3 0	103,183	52,882,386	
1	2 8	13,000	52,869,386	103,183
1	2 7	20,000	52,849,386	116,183
1	2 6	101,600	52,747,786	136,183
1	2 3	917,596	51,830,190	237,783
2	2 2	494,510	51,335,680	1,155,379
1	2 1	29,986	51,305,694	1,649,889
2	2 0	493,500	50,812,194	1,679,875
2	1 11	61,500	50,750,694	2,173,375
3	1 10	453,360	50,297,334	2,234,875
3	1 9	264,280	50,033,054	2,688,235
3	1 8	165,394	49,867,660	2,952,515
4	1 7	954,038	48,913,622	3,117,909
13	1 6	621,107	48,292,515	4,071,947
1	1 5½	24,500	48,268,015	4,693,054
7	1 5	1,139,970	47,128,045	4,717,554
5	1 4	493,374	46,634,671	5,857,524
6	1 3	2,294,419	44,340,252	6,350,898
10	1 2	330,025	44,010,227	8,645,317
4	1 1	129,780	43,880,447	8,975,342
16	1 0	1,556,411	42,324,036	9,105,122
12	0 11	9,701,520	32,622,516	10,661,533
10	0 10	409,256	32,213,260	20,363,053
16	0 9	1,299,223	30,914,037	20,772,309
16	0 8	23,922,176	6,991,861	22,071,532
2	0 7½	16,000	6,975,861	45,993,708
11	0 7	691,625	6,284,236	46,009,708
21	0 6	2,349,044	3,935,192	46,701,333
6	0 5	216,160	3,719,032	49,050,377
10	0 4	924,722	2,794,310	49,266,537
18	0 3	781,312	2,012,998	50,191,259
13	0 2	1,127,209	885,789	50,972,571
3	0 1	217,330	668,459	52,099,780
22	No margin.	668,459		
Datum.				Datum.
	Minus:			
2	0 5	17,767		
1	0 6	4,000		
1	0 7	13,720		
1	0 8	7,000		
252	Total. .	£53,028,056		

We now hear of "financial hardship," "Government subventions," and "solicitude" [for the consumer]. Well, we will not pass them over. In the law of production and distribution the burden passes on. The principle has already been swallowed in coke. Therefore why choke over gas? Or why accept in essence and pervert in Government subvention? Moreover, any superstructure of subvention, erected on the grotesque foundation of a gas sliding-scale, would produce queer building.

As to subvention itself, we should first require the findings of a Commission; and all recognize that it takes forty years to give effect to the recommendations of a Government commission! Meanwhile the incidence of war cost grows, and hits sliding-scale capital proportionately hardest at the datum line, and lightest at the top; not at all municipal undertakings; and maximum dividend concerns in only one or two extreme instances.

So much does the consumer appreciate gas as the means of securing victory abroad and comfort at home—recognizing at the same time that it is free from the taint of profiteering—that he is actually anxious to buy rather more than the supply at our command. *He* has not complained—then why this sudden solicitude? Interests clash at the extreme ends of the chart; and the art of diplomacy is being requisitioned. Its clothing, "Financial Hardship," "Government Subvention," and "Solicitude," however, runs on the lines of other fashionable negligé—with the same effect. Obviously, the penalty now being imposed upon sliding-scale capital must sooner or later be arrested, individually or else collectively.

Output of Sulphate of Ammonia in the United States.—The production of sulphate of ammonia in the United States in 1916 is, says the New York "Iron Age," estimated to have been 325,000 tons, an increase of 75,000 tons over that of 1915. Of the 1916 total, 272,000 tons are credited to coke-ovens and 53,000 tons to gas-works and bone carbonizing plants. The 1916 output of coke in the United States was a record for both beehive and bye-product ovens, amounting to over 54,000,000 tons.

The Withdrawal of Leaving Certificates.—It is understood that the National Gas Council have written to the Ministry of Munitions drawing attention to the fact that a very serious position is bound to arise in the gas industry should the proposals as to the withdrawal of the clauses in Munitions Acts relating to Leaving Certificates be carried into effect. The Council pointed out in their communication that the staffs of gas undertakings are already reduced to the minimum with which it is possible to meet obligations to the Government and to the public generally; and they urged that some effective steps should be taken to prevent completely free competition for labour on the part of all employers, with the supply so far below the demand. The result otherwise is likely to be chaos.

ELECTRICITY SUPPLY MEMORANDA.

Electrical engineers cannot possibly reach a proper objective regarding the future mode of advancing the economic situation of the industry in respect of electricity generation until there has been thorough investigation of the *pros* and *cons* of the various suggestions that have been advanced. At present nothing but very random statements are made.

Pit Mouth or Thames Generating Stations for London.

One writer in the "Westminster Gazette" was lately suggesting that the water "power" existing in Wales and Scotland should be utilized for the electricity supply of London. If water "power" was really to be found in these areas in sufficient quantities, and if permission could be obtained for the erection of the necessary high-tension transmission lines, it is open to doubt whether Wales and Scotland would be prepared to part with their birthright, but would prefer to apply it to their own electricity requirements. Moreover, the Welsh waters have been largely tapped for the water supply of various important cities and districts; and water supply to communities comes before electricity supply. Parliament would not sanction any interference with the rights they have granted in this direction. Mr. J. B. Braithwaite, who is largely interested in the electricity supply of London, has attacked the opinions of the writer in the "Westminster Gazette"—opinions which also travelled to the "burning" of coal at the pit-mouth, and the transmission of the energy thus produced to London or other great centres. Mr. Braithwaite questions the proposal by pointing to the essential of large supplies of condensing water at the pithead, which he is rather afraid is non-existent there in sufficient quantities. This is a point which we have made on previous occasions; and no one with his mind well-balanced will have any difficulty in seeing that the erection of water-works on the scale requisite for providing condensing water would hardly be a profitable proceeding, nor would it contribute to the economical production of electricity. Mr. Braithwaite caps the argument with the information that three eminent electric engineers, acting quite independently, have selected the same site upon the estuary of the Thames as the one that is best suited for the economical production of power for London. This conclusion, he states, was arrived at after fully considering the possibilities of placing the generating-station nearer the collieries; and it is assumed that the absence of the necessary condensing water near the pit mouth was the deciding factor. Large generating stations upon the estuary of the Thames would make fine targets for chivalrous bomb-throwers should we happen to get involved in another international scrimmage.

The Colliery Owner as Gas Supplier.

The contrary view of pit-head coal treatment and electricity generation is taken by Mr. T. R. Wollaston, in a contribution that he has made to the "Proceedings" of the Incorporated Municipal Electrical Association, in connection with Mr. Robertson's paper, read at the last annual meeting, on "Fuel Economy." To Mr. Wollaston's views attention is directed by "Electrical Industries." We gather that this advocate is of opinion that coal carbonization systems should be the *alpha* of electricity generation procedure. But he inclines to the view (which is now held by not a few electrical engineers) that coal carbonization should be under separate management—advantageously by the collieries, which will contract with the power stations to sell so many B.Th.U. as gas at a given price, and manage their own bye-product affairs independently. In his judgment, a power engineer has quite enough to do in looking after the supply of electrical energy. For our part, we cannot see the large electrical power stations being tied-up to any single colliery, as they would have to be, for gas supply. There would be no opportunity for securing competitive tenders for gas from various quarters, the same as is the case with coal supply. The collieries are good opportunists; and they are famed for getting the best possible price for coal. The deeply ingrained propensity would apply to gas as well as to coal. "Electrical Industries," however, thinks that "the settlement of the price charged for B.Th.U. as gas will probably be in the hands of the Government tribunal which will in future regulate the industry from the pit to the lamp and the motor"—nothing, it will be observed, is said as to the electric heater and the cooker. We do not see why the price of the gas supplied to the generating stations should be regulated any more than the price of electricity to the consumer; and if the price of electricity is to be controlled by the Government Tribunal, they may as well undertake the management of the whole industry. There is another danger. Miners are restless beings; and assuming a miners' strike and no coal-raising, the electrical stations depending upon the collieries for gas would look rather silly. That is why gas-works taking coke-oven gas have to maintain stand-by plant which they can bring into prompt use to compensate for any interruption in the supply of the coke-oven gas.

The German War Office Helps.

In Germany they have a way of doing some things different from what is the vogue in this country. There has been a great deal of trouble here as to the heavy war burdens causing increased charges to the gas consumers, which mean for sliding-scale companies heavy reductions in dividends, just when stockholders would be better pleased to have dividends maintained, if not increased. The "Journal" has kept its readers closely informed as to developments that are taking place in Germany; and the "Electrical Review" has an article bearing upon what is being done in connection with electricity supply. In this country, we get no help whatever from the Government in the matter of impressing upon the consumers the absolute necessity of increases of price—even of contract prices. Many British electric supply undertakings have contract prices for power which they dare not attempt to alter; and they would be inestimably obliged to the Government if they would tell these contract consumers that they should no longer expect, in simple justice, to have their electricity on the old terms. Look at Germany. A coal-tax has been levied at the pits by the hard-pressed Government; the collieries are told to add the amount of the tax to the accounts of their patrons; and these patrons, if gas or electricity suppliers, are instructed to transfer it to the accounts of their consumers. The cost of gas to-day in Germany is one-third and more what it is in this country under approximate conditions. The German War Office, using the Imperial Commissioner for Gas and Electricity as their channel of communication, have issued a notice to the public pointing to the 100 p.ct. increase in the price of coal, and the several 100 p.ct. by which other raw materials have risen in cost, as well as to the considerable burdens that gas and electricity undertakings have to bear through contributing to the support of the families of workmen called to the service of the country. These changes, the Government Department impresses upon consumers, have altered the basis of calculations; and so contract consumers cannot reasonably expect to be supplied at the old prices, when they themselves are realizing ample profits. Therefore such consumers will, it is anticipated, consent to pay gas and electricity works an increase of price equivalent to the expansion of the cost of production. All this is wonderfully kind of the high authorities. We devoutly wish for emulation here, as this is a matter in regard to which there could be emulation of the Germans without forfeiting honour.

Increasing the Maximum Price.

In dealing lately with the suggestion that an attempt should be made to increase the standard price of sliding-scale gas companies in order to give proprietors a dividend which (after the Inland Revenue Commissioners have taken their part) they can see without the aid of a microscope, mention was made of the fact that some of the smaller electric companies have obtained from the Board of Trade sanction to increase their maximum prices. The Launceston and District Electric Supply Company are making application to the Board for an increase of their maximum from 6d. to 8d. per unit, and for power and heating from 3d. to 4d. They must be multi-millionaires who pay 3d. per unit for heating in Launceston, and who will be prepared to pay 4d. The electric light consumers—nothing is said about the heating consumers—have held a meeting in order to discuss the application to the Board; but at the meeting the consumers were so overpowered by the doleful tale that the Directors and officials of the Electric Supply Company told them as to the effect of the war on the cost of materials, with the diminution of business through restricted lighting and the Summer Time Act, that they consented not to oppose the application, providing the Directors promised not to raise the price beyond 7d. per unit, unless special circumstances warrant it, and then will consult the consumers before raising the price above 7d. There is not the slightest doubt that the Directors could, when they have secured the necessary sanction from the Board, rake-up a fine show of special circumstance which would warrant a charge of 8d. That is a matter for the future. These increases of electricity maximum prices are interesting for more reasons than one. Used with the metallic filament lamp, 1 unit of electricity is equal to 800 candle-hours; used with an ordinary incandescent burner and mantle, 1 c.ft. will give 20 candle-hours. *Ergo*, 1000 c.ft. will give 20,000 candle-hours. To give 20,000 candle-hours, 25 units of electricity would be required with the metallic filament lamp. These would cost, at 8d., 16s. 8d.; at 7d., 14s. 7d.; at 6d., 12s. 6d. What a nice little point to make with gas consumers who talk, if they do not exactly grumble, about the price of gas having gone up to a few pence over (say) 3s.!

Marvels of Electric-Cookers, and the Boot.

We hear of some wonderful things in connection with electric cooking—only through electrical sources. Elsewhere we learn of electric-cookers being bundled out and gas-cookers replaced; the householder being glad enough to get back the old reliable, labour-saving, and economical cooker. A pamphlet by Mr. A. F. Berry, of "Tricity" fame, is noticed in the "Electrical Times" for Sept. 20. We find this statement in one part of the notice: "In one town where gas is supplied at 3s. 2d. and electricity at 1s. 2d. [*sic.*], a user found that with gas his cooking costs for three quarters in 1915 amounted to £11 1s. 3d., but that his outlay for current in the corresponding quarters of the following year worked out at only £7 5s. 9d." That is to say, this writer in the "Electrical Times" pretends—if Mr. Berry does not—that 125 units of 3420 B.Th.U. will do as much work as about 70,000 c.ft. of gas of 500 or more B.Th.U. per foot! The pamphlet does not appear, according to the notice, to give any details as to the relative work done in the two periods, nor does it vouchsafe any information upon which inquiries can be made into this

notable instance of the economy of electric-cooking. The pamphlet seems to give a large amount of information regarding the "saving" of meat by using "Tricity" outfits instead of gas-cookers. But we do not see that Mr. Berry explains how it is that using a gas-oven at an equal temperature to that of an electric-oven, and operating on a similar joint of meat, the electric-cooker should do better in this direction than the gas-cooker. We should like him (as no one else seems inclined to satisfy us) to give information on this point, so that we may discuss it. We notice from the proceedings at the Wales and Monmouthshire Institution of Gas Engineers [reported last week] that right away in Newport (Mon.) people have had experience of electric-cooker adoption, and of the application of the "boot," and the restoration of the gas-cooker. Mr. T. H. Hazell stated that he knew several instances in which, when a demonstration of electric-cookers was given by the gentleman whose particular office it was to push their sale, members of the local authority attended the lectures with their wives, and were so taken with the beauty and simplicity of the arrangement that they decided to have one as an experiment. After three or four spoilt Sunday dinners, they began to kick the cookers out of their houses; and in some cases he knew that gas had superseded them. This is a reproduction of experience in other quarters; and what is more, electrical engineers know that this is so. We have not seen Mr. Berry's pamphlet; but we undertake to say it does not contain particulars as to not a small amount of dissatisfaction.

Slot-Meter Deposits. We do not know the number of electric slot-meters of which Southend can boast; but apparently the Electricity Supply Department find that the small custom through them does not pay well. The Electricity Committee recently decided that slot-meter users should be required to pay a minimum of 18s. per annum; and now the Borough Accountant has been instructed to require payment of a deposit of 15s. from all persons employing such meters who have not during the last twelve months consumed current to the value of 18s.; and on and after Oct. 1, it is to be a condition precedent to the hiring of slot meters that a deposit of 15s. per annum shall be paid. We wonder what prepayment gas-meter users would say to minimum charges and deposits. More we are afraid than we should like to hear.

The Sarcasm of Envy. "Meteor" of the "Electrical Times" must have his little tilt at the flexible gas-container that has enabled numbers of industrial motor cars, omnibuses, and other passenger-carrying vehicles to run during the war that would otherwise have been laid aside wasting in their enforced uselessness. There is yellow in the eye of "Meteor." He no doubt wishes electricity could have been as readily applied to these thousands of vehicles that would have been motionless had it not been for the ever-ready gas. The flexible gas-container is only a rapid expedient serving a useful purpose. The light metal container built to stand gas under high pressure is on the road. The motor vehicle owner who can now use his car blesses the availability of gas. This is how envy sees the situation: "We once thought that the s.s. *Olympic* was the most imposing spectacle of man's creation. We have changed our minds; it is the gas-driven taxi. The crinoline of our grandmothers was a fool to it; for sheer bulk without substance it wins hands down. Nor was the crinoline quite so funny. It is a joy to see one of these balloons on wheels, especially with its gas-holder in a flabby, semi-collapsed condition; it surprises one to note that the driver looks perfectly serious though perhaps a trifle irritated." It is something to meet a man so light-hearted in these times that he can find joy in a flexible gas-container. But little things amuse——never mind, we will not try to dilute the joy of "Meteor."

Restrictions in Dealing in Calcium Carbide.—An Order has been made under which the Minister of Munitions takes possession, from Sept. 24 until further notice, of all calcium carbide, now or hereafter situated in the United Kingdom, except the stocks of persons who do not own more than ½ cwt. No person shall buy, sell, or supply, except for the purpose of carrying out a contract in writing existing at the date of the Order, enter into any transaction or negotiation in relation to the sale or purchase of, calcium carbide situated outside the United Kingdom, except under, and in accordance with, the terms of a permit issued under the authority of the Minister of Munitions. No person shall offer to supply or deliver any calcium carbide situated in the United Kingdom, except in accordance with the terms of a permit.

Society of British Gas Industries.—The autumn general meeting of the Society (whose President is Sir Robert Hadfield, Bart., F.R.S.) has been fixed for Thursday, the 18th inst., at 3 o'clock, at the Trocadero Resturant, Piccadilly Circus, W. The Chairman of the Council (Mr. Percy F. Holmes, J.P., M.Inst.Mech.E.) will give a short account of the Society's work in the past six months; and there will be a paper (to be followed by a discussion) by Mr. Samuel Cutler, Jun., Assoc.M.Inst.C.E., entitled "To the Continent by Channel Tunnel and Airship." At the close of the proceedings, by invitation of the Chairman of the Council, afternoon tea will be served. Owing to the war, the Council have considered that it would be the wish of the members generally that the usual dinner should on this occasion be dispensed with.

PRESSURE WITH GAS-STEAM RADIATORS.

IN connection with a reference made in the Special Radiator Number of "A Thousand-and-One Uses for Gas" to the possibility of excessive steam pressure with gas-steam radiators, Messrs. John Wright & Co. have sent to the Editor of the British Commercial Gas Association the following comment, which has been forwarded to us for publication:

The writer of the article is evidently quite unaware that some ten years ago the London County Council, before officially authorizing our radiators in public buildings in their area, sent down one of their experts, who took some of our radiators out of stock and submitted them to tests which went intentionally far beyond any conditions which could possibly obtain in practical use—loading the gas pressure up to 8 or 10 in., taking the automatic regulator away altogether, placing an additional burner or burners under the radiator, and having it all temporarily covered in so as to concentrate the entire heat upon the radiator itself. Even under those quite abnormal conditions, it was found impossible to get the steam pressure beyond a few pounds; whereas every loop of these radiators is tested to a pressure of 120 lbs. per sq. in.

It should, perhaps, be added that the statement criticized is substantially an extract from one of the best-known text-books extant upon gas manufacture and distribution. But the text-book, like the article in "A Thousand-and-One Uses for Gas," was written in ignorance of the London County Council test referred to, which, so far as we are aware, has not previously been made public.

HEATING BAKERS' OVENS WITH GAS.

In a recent issue of "Het Gas," Herr W. Meyboom gave some data concerning results obtained in Rome in the heating of bakers' ovens by gas. In Italy, this work is usually accomplished with wood; but to this fuel there are some drawbacks, which the use of gas does not possess. The most prominent factor, of course, is the question of working costs, though so far as Italy is concerned there is also another important thing—the prohibition of labour in bakers' shops during the night hours. This means that the time available for heating-up the ovens to baking temperature is too short to permit of the use of wood. When gas is used, the heating is so much more rapid that, while keeping within the hours fixed by law, the work may be accomplished promptly enough to satisfy householders.

These considerations caused the Societa Anglo-Romana, in Rome, to carry out practical experiments in the matter of gas-heated ovens. In the first place, it may be mentioned that in every case heating with gas was not practically lower in cost than when using wood. There are two main systems for oven heating —intermittent and continuous. For intermittent heating, the burners are placed in the oven, heating the brickwork; while for the continuous process, the heating is from the exterior, so that the necessary temperature may be kept constant. Naturally, the latter system results in lower fuel cost, as the efficiency is much higher.

The experiments have clearly proved that in intermittent heating only one-fourth of the total heat is absorbed by the brickwork; and of this one-fourth, only part is usefully employed. But against this, intermittent heating can be carried out in existing apparatus; whereas continuous heating requires a complete reconstruction of the brickwork.

Initial experiments led to the conclusion that, out of many appliances, the Méker burner and a new type of Oudeville burner ("Le Rapide") gave the best results. Gas was used in atmospheric burners, under a pressure of 16 to 24 in.; and quantities of 400 kg. of bread were baked, the cost working out as follows:

Wood	6·72 frs.
Méker-burner	7·42 ,,
"Le Rapide" burner	7·84 ,,

The oven used for the experiments was 15 ft. long, 11 ft. 8 in. wide, with a height increasing from 1 ft. to 2 ft. The temperature varied at different stages of baking between 170° and 250° C.

Sulphate of Ammonia in South Africa.—Dealing in his report for 1916 with the agricultural and industrial developments in South Africa, the General Manager of Railways and Harbours says that large works for the manufacture of ammonia have been erected near Vryheid; the principal product at present being sulphate of ammonia. The company operating these works have a sulphuric acid plant capable of producing 7500 tons of acid per annum.

Rate of Cooling of Coke.—Some comparative experiments on the time which hot coke takes in cooling have, says "Engineering," been made at the Technical High School of Breslau, on specimens of coke from the various coal districts of Germany, on the Rhine, the Ruhr, the Saar, in Saxony, and in Upper and Lower Silesia. The specimens were heated up to 800° C. in an electric furnace with exclusion of air, and cooling curves were obtained by the aid of thermocouples. The specimens were small, about 15 cm. in dimensions, and the experiments cannot claim more than a comparative value. All the curves were very similar. The cooling of the inner layers of the coke took as many minutes as the cooling of the surface layers took in seconds—*e.g.*, from 30 to 40 seconds to cool from 800° C. down to ordinary temperature.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

GENERAL MEETING IN LONDON.

There was held on Friday last, in the Queen's Room at the Holborn Restaurant, the fifty-sixth general meeting of the Association, when a great many points of the utmost importance to the industry at the present time were discussed. For reasons which will be understood, some portions of the proceedings are omitted from the report; but what does appear is sufficient to indicate that a busy afternoon was spent. The occupancy of the chair passed from Mr. John Terrace, of Grimsby, to Mr. J. H. Brearley, of Longwood; and the main debate, which was opened by a written contribution by the New President, was on the subject of "War-Time Experiences of Gas Undertakings."

At the opening of the meeting, the chair was taken by Mr. John Terrace, of Grimsby.

Minutes of the Last Meeting.

The Hon. Secretary (Mr. F. M. Paternoster, of Felixstowe) read the minutes of the meeting held last May; and they were confirmed.

Letters of Regret.

The Hon. Secretary said that among those from whom he had received letters regretting inability to be present were Lord Moulton (the President of the Institution of Gas Engineers), Mr. H. E. Jones (the President of the National Gas Council), and the Presidents and Secretaries of other District Associations.

New Members and an Associate.

On the proposition of Mr. H. Duesbury (Hertford), seconded by Mr. C. F. Veevers (Northfleet), two new members were elected: Mr. F. W. Taylor, the Engineer, Manager, and Secretary of the Harpenden Gas Company; and Mr. F. A. West, the Engineer and Manager of the Newark Gas-Works.

Proposed by Mr. H. Wimhurst (Sleaford), and seconded by Mr. H. G. Ruggles (Leighton Buzzard), Mr. J. W. Scott, of Messrs. R. & J. Dempster, Ltd., Manchester, was elected an associate.

The Old President and the New.

Mr. Terrace said the next matter was a very pleasing one, but it was also in some ways tinged with regret. He referred to the induction of the new President as being the pleasurable part, and to his own passing out of office as the subject of regret. In these days of momentous happenings, the passing of the President of the Eastern Counties Gas Managers' Association seemed a very small matter indeed. Nevertheless, so far as the Association was concerned, it marked another milestone, and meant to all of them that another year's business had been gone through. Much as he might feel disposed to remark on the shortcomings of his service during the past year, he did not intend to do so. The times had, indeed been trying; but he had always endeavoured to do his best. ["Hear, hear."] What had not proved successful he trusted would be put down to force of circumstances. Now that they had settled down more to war conditions, and were trying to carry on the business of the various organizations to the best of their ability under the circumstances, it was pleasing to think that the affairs of so important an Association as theirs—because he held that it was very important indeed—were to be in such good hands as those of their new President. Mr. Brearley was well known to all present, and to the members generally of the gas profession. They knew him as a worker, and also as a thinker; and it would be agreed that he was just the type of man who was wanted to carry things forward. He might be looked upon as a man of constructive ideas, who was always wanting to place things further than he found them; and whatever the difficulties might be in the coming year, they could with confidence anticipate a very successful time. He could assure the new President that in his duties he would be greatly comforted and helped by the support of the Secretary, of the Committee, and, what was more important still, of the members themselves. A part of his own regret at leaving the chair was the fact that he would be getting out of touch with the close friendly feeling which always existed between the members of the Association and the President. He took this opportunity of thanking them all for the kindness and consideration shown him during his year of office.

Mr. J. H. Brearley (Longwood) then took the chair, and was accorded a hearty reception. He said he could hardly find words to adequately thank Mr. Terrace for all the complimentary remarks he had made about him; but he would do his best to deserve them. The times were, of course, very trying; and it had been a revelation to him to find what an optimistic disposition could do for a man who came in contact with it. Mr. Terrace, always with the same smiling face and the same genial presence, had been a tonic to him, as he must have been to other members of the Association who had met him during his year of office. By some curious arrangement he (Mr. Brearley) had to deliver his formal Presidential Address not immediately upon taking the chair, but at the next meeting.

The President's Medal.

The President remarked that it was now his pleasurable duty, in consonance with previous practice, to hand Mr. Terrace the President's Medal, as a memento of his year of office. Though its intrinsic value might not be great, yet the sentimental associations surrounding it were very valuable indeed. He was quite sure Mr. Terrace would prize the medal as long as he lived; and that some day he would hand it down to his successors as evidence of a very happy year spent in the presidential chair of the Association.

Mr. Terrace, on taking the medal, said he could assure the President and all the members that, with the pleasant recollections he had of his year of office, it did not need any tangible token of this kind to keep it in memory. Nevertheless, he would prize the medal greatly, and would wear it with pride.

The President said that before proceeding to open the discussion, he would like to say that the remarks he had prepared were more or less upon general lines; and he hoped that in the debate which would follow members would feel no reluctance to speak on matters relating to their difficulties during the past two or three years. He was quite sure they could depend upon the Press to exercise sound judgment as to what should or should not be published. He had some doubts as to what he should or should not say in the printed matter; but in the discussion they need have no such anxiety. He then proceeded to read the following

WARTIME EXPERIENCES ON GAS UNDERTAKINGS.

The fourth year of the struggle which is to determine whether we shall be bondmen or free, and whether nations shall retain heads erect or bend them in homage to Teutonic barbarity, has now been entered upon. It is appropriate to search the experiences of the past three years, the better to meet the urgent needs of the immediate future and the not less vital days that lie beyond. It is food for congratulation that the gas industry has little to recriminate itself with in the memorable period which has elapsed since August, 1914.

It has continuously occupied an honoured position in the reserve trenches—providing vital supplies for the battle fronts abroad, and ministering to the not less important needs of food productivity at home. The national needs have ever been the first consideration of all those who have had the destinies of the great gas industry to direct; and it is unthinkable that such unstinting services will not in due time receive their reward. At present patriotic endeavour is the watchword; and so it will continue until the victory of right over might has been achieved.

Capital and Finance.

In regard to capital, there has been witnessed not only depreciation in the value of stocks and shares due to the great rise in the value of money, but also—and more especially in the case of sliding-scale companies—a further depreciation due to a decrease in the rate of dividend, consequent on the unavoidable raising of gas prices. In the case of companies alone, depreciation represents something like thirty millions sterling. It is anomalous and unfair that war conditions should have such a disastrous effect upon an industry which is so essential to the successful prosecution of the war, and affords a marked contrast to the condition of things in most other industries engaged directly or indirectly upon war work. No fair-minded person can quarrel with the efforts to put down profiteering, or the fixing of an excess-profits tax. When pleading for some adjustment to minimize the financial hardships of gas undertakings, we are a long way removed from either category. If the Government is approached in regard to this matter, it is eminently desirable that the gas industry should be perfectly unanimous. There may be a few undertakings which have suffered no hardships on account of the sliding-scale or otherwise; but this should not prevent them lending support to a scheme having for its object the relief of those which have.

It has been suggested that local authorities are somewhat differently situated from companies. This, however, is more apparent than real. The same adverse conditions beset them; and if they do not pay dividends to proprietors, they nevertheless pay considerably higher rates for interest on loans, and whatever loss they incur must be made good either by an increase in the price of gas or by an impost on the rates. This matter is shortly to be discussed at a general meeting of all statutory gas companies; and it is to be hoped that an equitable basis may be discovered, which will unify both companies and local authorities in an effort to obtain redress.

The Special Committee which was formed to consider the question of financial hardship of gas undertakings unanimously decided to call a meeting of all statutory gas undertakings to thoroughly discuss the matter. Since that was resolved upon, I have ascertained that the matter is now under consideration by the National Gas Council. It may be assumed, however, that the general meeting of statutory gas undertakings will still be called, as no decision on so important a matter should be arrived at without giving all statutory undertakings an opportunity to ventilate their views.

The Treasury restrictions upon the raising of new capital have had the result of arresting all extensions except those of an imperative war character Money will probably remain dear, not only for the period of the war, but for a long time thereafter; and the financing of gas undertakings when the work now held in abeyance is taken in hand will be no light or economical task. Bearing in mind the national indispensability of the gas industry (whether in peace or in war) it would seem that a suitable solution of this problem would be afforded by Government loans to gas undertakings, whether belonging to companies or local authorities. In this way, the money would be raised more cheaply, and

the community would benefit. When the Government were approached in the early stages of the war, the proposal was not favourably received; but the various developments since then afford material for a much stronger case. National economy is very much to the fore (in theory at all events); and this is indeed a sphere in which national economy can be practised. If gas, as many believe, is to have a boom in the future, it is desirable that the money wherewith to meet it should be raised as cheaply and as expeditiously as possible.

Coal and its Transport.

Passing from capital and finance to trading considerations, the item that takes first place in our minds, as it does in the revenue account, is coal. The Price of Coal (Limitation) Act has, in the event, proved a wise measure. Many efforts to ride roughshod over it were made; but generally speaking the coal selling community have by this time settled down to the inevitable.

Every coal contract now contains clauses relating to certain possible eventualities as to price and deliveries. These may be left to the caprice of the future.

The condition introduced into contracts last year altering the rate of deliveries from 40 p.ct. in the six summer months and 60 p.ct. in the winter months to equal monthly deliveries throughout the year, has appreciably added to the cost of coal—the extra cost of putting into and taking out of store being by no means a negligible item. Owing to the inadequacy of covered storage, many undertakings have had to resort to storage in the open; and the increased handling of coal cannot but have adversely affected the quantity of gas produced per ton. As soon as the time is opportune, efforts should be made to have the old ratio restored.

Supplies, apart from price, have been a fruitful source of anxiety during the last two years. There is a certain amount of negative satisfaction in knowing that our conditions to-day are vastly superior to those that obtain in Germany, if the recent meeting of the German Association of Gas and Water Engineers is anything to go by. [There is a very useful comparison in this week's "Gas Journal," which shows that our conditions are better than those in Germany.]

The authorities have apparently taken to heart the lessons to be derived from German experiences, inasmuch as they urge the use of gas for all purposes where practicable. It is worth emphasising that the use of gas eases transport. One ton of coal converted into gas affords as much heat for domestic purposes as over 30 cwt. of coal used in the form of solid fuel, and is manipulated practically without labour.

In this connection, surprise may be expressed that labour and materials can be found by electrical firms for the purpose of substituting electricity for gas. One would have thought that, for the duration of the war, an absolute veto would have been placed upon this form of national dissipation; for at least two adequate reasons: (1) It is a superfluous use of labour and materials; (2) It reduces the quantity of gas-works residuals so urgently needed to prosecute the war.

Difficulties have included transit by rail and sea—undertakings the furthest removed from the coalfields suffering most acutely. Many of the smaller undertakings, which depend not only upon the railway but also upon carting, have had their measure of anxiety on this account alone. The sectionizing of the country for coal distribution aims at more equitable distribution; and the coming winter will furnish a criterion as to the strong and weak points of this latest departure.

The coal redistribution scheme has been already a serious source of anxiety to some undertakings, which have found their usual source of supplies cut off, and have had to make an effort to substitute new contracts for those cancelled by the action of the Coal Controller. So far as this Association is concerned, however, I believe there will be little, if any, interference with the former source of supplies.

Supplies have been little interfered with by disputes at the collieries; but the quality of deliveries has been greatly below pre-war days. Shortage of labour at the picking-belts is the stock explanation, or excuse, afforded whenever one has the temerity to complain.

The pooling of railway company's wagons has been voted a success. As yet, private wagons have remained untouched; and it certainly seems that they should remain so. Those who have exercised foresight in providing for their requirements should not be penalized for those who have not—always assuming that the national wellbeing is not thereby jeopardized.

Purification.

In regard to purification, imports of natural bog ore have practically ceased; and gas undertakings have now to rely entirely upon artificial oxide. At Longwood, we used very little natural oxide even prior to the war. Possibly some members may have experiences to relate in this direction.

Labour Questions.

Everyone has suffered more or less on account of labour shortage. Days could be spent discussing experiences in this regard. The gas industry was in the forefront in encouraging recruiting when the war broke out—in numerous cases supplementing the recruit's pay from the gas-works funds. Though there may be no regrets, some may be excused if they feel to-day that the country's needs would likely have been better served if they had hastened more slowly. The tribunals which were set up to deal with claims for exemption have shown a wonderful diversity of view as to the claims of the gas industry. When the war's demands are so great, however, someone is bound to suffer; and if our labour burdens be greater than appears just, we must count it part of the price for the better future we hope to secure.

Meanwhile, women have stepped into the breach, and are now doing tasks which were undreamed-of in all our pre-war philosophy. At the same time, it falls to be recorded that not every gas undertaking has done its utmost. In our own case, we have not a single male employee on either slot or ordinary meters, nor on the collection of accounts, while women are turning over oxide, wheeling-out clinkers, cleaning stoves, and other similar jobs. The greatest difficulty is, speaking generally, experienced in finding satisfactory men to fill vacancies arising in the stoking staff; and in this regard the lot of the managers of small works is very onerous, when the withdrawal of a single man represents a considerable percentage of the total man-power for gas making.

In regard to wage-earning, the anticipation that the labouring classes during the war would have a bad time, if we exclude the labouring professional classes, has been absolutely falsified. We are living in a more or less artificial state. But so long as the war lasts, there will be work in abundance; and making all allowance for the higher cost of living, workers on weekly wages are having a better time than ever they have experienced. The people who are being hardest hit by the war are the professional classes, who have to bear the increased cost of living and higher taxation on the one hand, while no one seems to think they are entitled to any war bonus on the other. Yet these very classes, so far as the gas industry is concerned, have had both their work and their worries greatly increased. Truly for these, war conditions do not double their joys and halve their sorrows!

Other War-Time Troubles.

To undertake extensions either on the works or in the district is now practically out of the question; while the materials necessary for repairs are increasingly difficult to secure. The system of permits is unpalatable, but unavoidable; and the question of inconvenience in this regard should always be viewed from the national rather than the individual standpoint. Really we are getting along very nicely on the whole; and if we experience at any time some feeling of hardship, we have but to cast our eyes across to the countries of the Central Powers to find an effective antidote.

Those gas authorities which possessed up-to-date works in excess of the demand when war broke out, may count themselves especially fortunate. Constructional costs have mounted higher and higher; and no one can foretell when normality will again come. At Longwood, in consequence of the amalgamation with Slaithwaite which took effect on Jan. 1, 1915, we embarked on the erection of new works in June, 1915; and these were so far advanced as to enable gas-making to be commenced towards the end of December, 1916—exactly a year later than was provided for in the contracts. Although there were times when we wondered, in view of the difficulties encountered, if it would not have been better to have waited, we are grateful to-day that we did not do so.

Higher working costs have resulted in a general advance in gas prices; and yet this advance makes favourable comparison with other commodities. Most people imagined there would be a considerable reduction in the output of gas so long as the war lasted; but few could foresee the gigantic demand for munition purposes. The effect of war on individual undertakings has been vary varied. Many undertakings whose engineers are members of the Association have been hard hit—more particularly on the coast line; but we feel sure they will weather the storm, and that the rejuvenating breezes of these attractive resorts will not be long before they again attain their old-time popularity.

The lighting restrictions have had their due effect in reducing the consumption of gas; but the comparatively long spell of hot weather during the summer months of the present year has done much to neutralize the set-back of last year, when both the lighting restrictions and the Summer Time Act were first experienced.

Residuals.

Taken as a whole, residuals cannot be said to have contributed as much towards working costs as might fairly have been anticipated. Coke has been satisfactory, for the simple reason that, with few exceptions, its sale has been unfettered, except by such difficulties as have attended its transport to the consumer by rail or cart.

Tar for a long time remained a source of anxiety on account of the difficulty experienced in dealing with pitch. Various works experimented with pitch for gas making; but to-day little is heard of this method of keeping production within manageable limits, and it seems to have fallen largely into desuetude. Creosote, from being almost an absolute drug, has now become one of the most important distillates; and for its recovery in adequate quantities, the greater production of tar is urgently called for. The requirements of toluol and benzol are being adequately met. The way in which this has been accomplished has been a fruitful source of contributions to meetings of gas engineers and the Technical Press; and these papers and articles have revealed how thoroughly the gas industry can meet an emergency when called upon to do so. An incidental result of the process of recovering benzol by washing the gas with creosote oil, has been to finally discredit the illuminating power test as applied to gas undertakings.

Home demands for munition making have taken large quanti-

ties of concentrated ammoniacal liquor, estimated in 1916 as the equivalent of over 70,000 tons of sulphate of ammonia. In the same year, the home consumption of sulphate of ammonia was 178,500 tons, as compared with 128,000 tons the previous year. There were exported 259,500 tons. In discussion on the Corn Production Bill in Parliament, the President of the Board of Agriculture (Mr. Prothero) said the farmers took in the spring of the present year nearly three times as much as in the corresponding period of 1915; and he anticipated a greatly increased demand for 1918. He stated that each hundredweight of ammonia meant an addition to the wheat supply equal to feeding a man for a whole year on Lord Devonport's rations. This reference to the advantage of ammonia in fertilizing should be very useful in our propaganda work.

The figures at which maximum prices were fixed for sulphate sold to farmers have given very general dissatisfaction among producers. Although we hope and expect to see the home demand for sulphate grow greatly, our organizations will have to fortify themselves against the powerful influences which the farmers appear able to invoke, if the time ever comes when we have to rely solely upon the home markets. The farmer needs pushing very hard before he will depart from his accustomed way of doing things; and possibly the present home sulphate prices may be regarded as a tempting concession by the authorities to induce him to use sulphate more freely. Unless circumstances alter, we cannot view as an unmixed blessing a state of affairs in which we were permanently cut off from all export markets. For the time being, the advent of war has effectively countered the German efforts to capture the world's markets. When the war is over, we may reasonably hope to command a fair share of the foreign trade, if sulphate maintains its position in comparison with other sources of nitrogen. Doubtless the Sulphate of Ammonia Association are looking ahead, and formulating their plans accordingly.

The maximum price fixed for sulphuric acid was much higher relatively than that fixed for sulphate of ammonia. Spent oxide, however, has commanded good prices, and afforded a substantial set-off. The use of nitre-cake for sulphate making does not appear to have been a success.

GAS FOR LIGHT, HEAT, AND POWER.

As a result of war experiences, we may anticipate that the question of what is the best quality of gas to supply will not be allowed to rest until a satisfactory solution is arrived at. Research into the subject is proceeding, in which presumably calorific value, flame temperature, and composition will all have due consideration. A national standard, as distinct from individual standards, would have many advantages. It would make easier the standardizing of appliances of various kinds, and reduce the need for adjustments *in situ*. Methods of manufacture, however, are so varied, and the coals available are so diverse, that it is difficult at present to see how a standard that shall at the same time be a practical working standard can be set up to suit all circumstances. That depends entirely on what the standard is. If the standard is a low one, I do not think there would be any difficulty about a national standard. It would have to be one to suit the poorest coals in the country, as well as the richest. If the ideal quality from the point of view of the user is determined, it will afford a mark to aim at; but premature legislation must be resolutely guarded against.

Gas as a source of power in motor traction is making headway. No great progress, however, can be expected until the problem of storage under pressure on the vehicle which it propels is satisfactorily solved. At present, I am given to understand that even experiments in this direction are impracticable.

[This was written before the Glasgow experiments. But Glasgow has made the compression of gas a success in a limited way; and I quite anticipate that after the war there will be a great development in the use of gas under compression.]

BESETTING PROBLEMS.

Taking an all-round survey, we may claim to have won through splendidly up to the present time; and whatever the problems which beset us, we mean to do so until the great argument has been settled. Those members of the Association who are in the actual war zone have to face problems peculiar to their geographical position. They may be assured that members more favourably placed have ever a kindly thought for them, and a full confidence that the British pluck which they have inherited will carry them through all their anxieties.

What of the future? The price of gas may not yet have reached its peak. When we look down again upon the fair plain of lower prices, it should be an axiom that the descent has not begun until the works have again been brought up to "concert pitch." Where reserve or other funds have been emptied, they should be refilled. The public are reconciled to high prices; and we should aim at firmly re-establishing the financial structure of the industry. By so doing we shall best serve the ends of permanent national economy, and give the best value in the effort to restore the ravages of war.

DISCUSSION.

The PRESIDENT, having concluded his remarks, said he hoped many of the members had come prepared to discuss the questions he had raised. He would first ask Mr. Thomas Glover to address them

Mr. THOMAS GLOVER (Norwich) said he thought they were very much indebted to their new President for having put together such an excellent review of the situation; and it was a review which he was sure appealed to them all. It touched upon every point that one could conceive to be of vital importance under these war conditions. It would no doubt be a very severe tax upon any ordinary person to be faced with the anxiety of preparing what practically amounted to two Presidential Addresses during one presidency; but there might be some advantage in what had become somewhat of a practice with the Eastern Counties Association, in that it, as it were, whittled down those who were possible Presidents, and ensured that they would have a man of ability in the chair. At all events, Mr. Brearley's literary ability had probably made the task less difficult for him than it would be for most men; and he appeared to have tackled it in a very masterly manner. The object of this pre-Presidential Address was to raise a discussion; and any meeting of gas engineers could discuss what had just been put before them.

EQUAL COAL DELIVERIES.

As to coal supplies, he (Mr. Glover) observed that, following North Country practice and ideas, the President favoured the delivery of 40 p.ct. in the six summer months and of 60 p.ct. in the six winter months. He would like to say that the tendency was that the collieries should insist on equal monthly deliveries; and the number of those who practised this method would grow larger and larger as the years went by. Though it imposed some disadvantages on gas-works not hitherto prepared for the system of equal monthly deliveries, yet the plan was one which possessed advantages. The collieries were there with all their staff and all their capital; and they had labour difficulties. It was much better for them to be able to meet all their gas-works requirements by equal monthly deliveries, instead of having this excessive production in winter and a reduced output in summer. The conditions for working at the pits—though down below it did not make any difference whether it was winter or not—must be better in the summer for handling the traffic; and therefore they were more capable of doing 60 p.ct. in summer and 40 p.ct. in winter than the reverse. Consequently, when laying down works in future, he would advise that provision be made for equal monthly deliveries, by the building of larger stores and the installing of better appliances for getting coal out of stock and into the retort-house. It did not require any particularly good prophet to forecast that this would have to be done in the future.

THE QUESTION OF PURIFICATION.

There was another thought which was suggested by the President's address, and that was in reference to purification—the extraction of sulphur and the making of sulphuric acid. This was one of the benefits conferred by the gas industry on the country which had been almost neglected; and yet it was a most important one. Sulphuric acid was said not very long ago to be the life-blood of the country. When this country went to war, its ability to produce sulphuric acid was very much below the necessities of the case; and as the submarine menace had developed, the difficulty of finding raw material for making sulphuric acid had increased. First it was plant; and then, secondly, it was raw material. Now, the gas-works, very quietly and without it being recognized, had been producing a very large quantity of raw material for sulphuric acid making. The conversion to oxide purification which had become almost general ensured that sufficient sulphur would be extracted from the coal to make enough sulphuric acid to neutralize all the ammonia which was also produced from the coal. He did not know whether this had occurred to them. And, in addition to this, a very considerable excess of sulphuric acid was produced from the sulphur extracted from the coal which they carbonized. They had not in the Eastern Counties many large works in which it would pay to put down sulphuric acid plant to burn their own oxide; but it was possible to make advantageous arrangements with a chemical works to take the spent oxide—or what was called spent oxide, but might be termed oxide charged with sulphur—burn it, and supply the sulphuric acid to the gas-works for sulphate of ammonia manufacture, and also to return the burnt material to the works. It could by suitable means be re-hydrated, and brought back into service; and so the process could go on continuously. It would, perhaps, be rather bad for the oxide merchants. There was no prospect of their making a fat living out of it; but it was good for the gas-works, and it was a thing which, if properly worked, under suitable conditions, could be made to pay the whole cost of purification and leave a little margin of profit.

GROWING DEMAND FOR GAS.

One of the things touched upon by the President was the demand for gas; and it had been suggested that some works had suffered a reduction in consumption. He (Mr. Glover) thought the trouble just now was to find coal, plant, and labour enough to meet the growing demand for gas—especially where there were munition works. His own experience was that war hospitals, munition works, and general consumers were all crying out for more and more gas, and that gas had never had such a time as at present. It was in many towns being used for all sorts of industrial purposes for which it was never used before—including the melting of metals, the making of aluminium castings, &c.—and the war hospitals were taking enormous quantities. But the most striking thing was, more money being about, the extra amount of it that came through the slot-meters. This was the healthiest sign of all; for it was likely to continue after the war, provided there still remained the money to spend. It was one of the things that might be said for a higher rate of wages that, when the working classes got more money, there was more money to spend. Certainly, wages in some parts of the country had been much too low; and although gas managers might get worried at times by demands for increases in wages, the matter had a better side to it. A higher general standard, he thought, would be good for the industry.

UTILIZATION OF PITCH.

With regard to tar distillation and the utilization of pitch for gas making. He (the speaker) had not dropped the use of pitch. In winter time, he carbonized 5 p.ct. mixed with the coal, simply because they did not know what to do with it. They did not choose it in preference to coal; but it did give, mixed with the coal, gas and coke, and he had no doubt some anthracene oil which was left in the pitch they got back

in the tar. But the better outlook for pitch which he hoped would develop in this country as soon as the restrictions were relaxed lay in the provision of more briquetting machinery. This, also, would be the solution of the best outlet that could be found for excessive quantities of coke breeze. With a mixture of 10 p.ct. of pitch and 90 p.ct. of coke breeze, an "Ovoid" briquette could be made which could be used for domestic fires or for firing boilers. One of the advantages of briquettes for such a purpose as boiler fuel would be the uniform quality. Many of them were using under their boilers the dross and all the material they could not sell; but the worst part of this was that the quality varied very much. At one time the boiler-man might be using furnace pickings containing large pieces of coke, and at another time the fine screenings from coke; and the two did not agree very well, and one found afterwards with the clinkers unburnt pieces of coke. All of them detested waste, and so disliked seeing carbon among the clinker. These were days of economy; and they should see that the least possible amount of material went away from the works that could be burnt. Every bit of carbon that could be used should be used on their own works. He meant to say that all the carbon which they could not sell should be turned into useful energy of some kind; and he thought briquetting was one of the means by which they could economize in future. Pitch had a very high fuel value. Unfortunately, they could not stoke it on the fires as they could slack; but he had tried—and he heard of others trying—to utilize the pitch without briquetting with common fuels, with good results. But the ideal was to convert it into suitable sized briquettes; and it seemed a pity that they should send such large quantities of pitch out of the country. If its value were realized on the Continent, they themselves ought to know how to use pitch in their own country.

Creosote, Benzol, and Toluol.

Then creosote, benzol, and toluol were touched upon by the President. The fuel oil position was, he (the speaker) understood, somewhat easier; but the Government had now got their hand on creosote, and probably its full value would be realized for national purposes, instead of importing such huge quantities from the other side of the Atlantic. He did not know whether any of those present had used creosote for boiler-firing. It could be so employed with beautiful results as regarded steadiness of the heats supplied. The burners sprayed the oil; and they were easily regulated to a steady head of steam. As compared with solid fuel, the cost per heat unit of creosote at its market value came out high. As to benzol and toluol, they were proud of themselves as an industry for having done great things for national purposes; but he was sorry to say the Eastern Counties did not show up prominently in this respect. A return was sent to him from the Ministry of Munitions every month showing the quantities of benzol and toluol extracted; and he had worked it out per ton of coal for the places enumerated in the return. What he referred to now was, however, not the quantity extracted per ton by those who were doing it. They were doing fairly well. It was the fewness of those who had adapted their plant, or put in plant, for oil washing and extraction that he deplored. He was quite recently up in Scotland visiting some of the smaller works there, and was very much interested and pleased to see the home-made appliances that had been put to work in comparatively small places for the absorption of benzol and toluol by wash-oil and the recovery of crude benzol. He thought the ingenuity of the managers in the Eastern Counties had not been put to such use as it might have been. More might have been done in this respect to get some definite and tangible results in the form of benzol and toluol. He could name many works that were doing well; and his friend Mr. Auchterlonie was "at the top of the tree," extracting at Cambridge the largest amount per ton of coal of any works in the Eastern Counties. He congratulated him heartily on this achievement.

The Price of Sulphate, &c.

With reference to the price of sulphate, he agreed with the President that the price fixed by the Government was an unfair one, and that the industry was not called upon to subsidize agriculture—to the great advantage of agriculture, and to the disadvantage of the gas industry. With the price of sulphuric acid so high, the price of sulphate of ammonia should have been fixed higher. Something, too, might be said of the prices paid for benzol and toluol, which were rather below pre-war rates; but, as the President remarked, after all they were doing very well, and must not complain. Let them persevere in their well-doing, and come out in the end, not only with easy consciences, but gratified to reflect that they had done their part in winning the victory.

A Vital Matter.

Mr. George Helps (Nuneaton) said he was just going to devote a few minutes to tackling three lines of the President's paper. These lines were: "One ton of coal converted into gas affords as much heat for domestic purposes as over 30 cwt. of coal used in the form of solid fuel." When he last had the pleasure of saying a few words at a meeting of the Eastern Association, he was asked, when he sat down, whether his remarks were to be taken seriously or as being humorous. They might be taken whichever way suited his hearers the better. He thought it was well on some occasions to forget that they were gas men, and to come to these meetings simply as individuals having some general knowledge. There were members there who were commercial experts; and the remarks he was going to make would probably appeal to them, and he hoped give them an opportunity to help in a very vital matter. Exactly what the President meant by this ton of coal converted into gas, he did not quite know; but he would make his remarks, and the President would be able to clear up any misinterpretation, if he (the speaker) made it, in regard to that. What he wanted to point out was that, taking a ton of coal at 30s., a ton-and-a-half would cost 45s. Now, if they got a ton of gas it would be something like 65,000 to 70,000 c.ft., which, at 2s. 6d. per 1000 c.ft., would come to £8 or £9. Had they ever looked at the matter like this? They were buying coal and converting it into fuel; and, at 2s. 6d. per 1000 c.ft., selling it at £8 or £9 per ton. Where was the commercial man who bought a thing and sold it again at (say) nine times the price, and expected to do well for long? It was the most vital matter in the remarks made by the President. The B.Th.U. in the gas that they obtained from a ton of coal might be taken as 6,000,000. In a ton of coal there were 30,000,000 B.Th.U. What were they doing with the remainder? He put it to them that it was an absurd thing that they called themselves gas men, and for a hundred years or more they had been turning out gas, and talking about it being the best fuel there was, and selling it at £9 per ton! The electricians were dealing with fuel, and they were beginning to admit that gas was the best source for their "juice"—as they termed it. Of this there was not the remotest doubt. Looking round, they found that people were selling electricity at anything up to 8d. per unit; but his calculations showed that there was no reason for any current to be sold at over 3d. There was certainly no reason for any gas to be sold at 2s. 6d. per 1000 c.ft. They would no doubt say: "Well, what are you doing?" His reply was, that he was playing the fool with the rest of them. They could not get away from it. Was it not the most absurd proposition for them to buy coal at 20s. to 30s. per ton, and expect to sell their gas at £9? If they looked at the matter in this way, they would find they had been making a mistake; and the sooner they discovered this fact, the better it would be for them as individuals and for the Empire.

Suggestions for Purification.

Mr. John Terrace (Grimsby) remarked that he would like to join with Mr. Glover in congratulating the President on the splendid points he had raised for discussion. Mr. Glover had already dealt so fully with the question of the 40 and 60 p.ct. coal deliveries that, as his own time was somewhat limited, he would pass over this. He might, however, say that personally he quite agreed with Mr. Glover's view. The question of the financial hardships of gas undertakings had been raised in the paper; and he hoped some of the members would give their views on the subject, because it was well known that the whole matter was to be discussed very shortly at a meeting of the statutory companies. Mr. Glover had just given them some interesting notes with reference to purification. The point that seemed to him to have come out most clearly in recent discussions in connection with purification on the lines that Mr. Glover had laid down was that for easy, comfortable, and cheap purification, one must have plenty of area. Many of the older and smaller gas-works, no doubt, had four boxes—three at work and one off; and where this was the case, it would certainly be greatly to the advantage of the undertaking to alter the connections so as to be able to use the four. But in many of the older works the four original boxes, three on and one off, were used as catch boxes with the three in series. He had recently had to tackle the problem of the gas pressure thrown by these boxes, and had found that, with a very simple alteration of the connections, the same centre-valve might be used and the bulk of the connections, so as to be able to employ the boxes as two sets of two—that was to say, an A section and a B section. If any members would like particulars of this, he would be very pleased to give them. With the use of gas for buses and taxi-cabs, he had had considerable experience at Grimsby, and it appeared that they were to have a good deal more. It would be interesting if the members would discuss the question of a standard size of pipe-connection from which the gas containers had to be filled. There seemed to be no doubt that the "gas bag" would have at least a very useful field for the time being; and it was possible that it might even remain afterwards. He would also like to know the experience of any members who were supplying gas through a meter to these bags—if the gas was being taken through the meter at such a rate that the meter was being worked very much beyond its capacity. Perhaps some of those who were well versed in the construction of meters might be able to furnish good information on this point. He thought the main lesson that the war had taught them was that they ought to count their blessings, and not grumble at their adversity. They all had troubles—many of them very real; and he fancied at times some of them were not so bad as they were made out to be. Any remarks that afternoon on difficulties which had been overcome, might help them to look upon what they considered great troubles as being perhaps not so very serious. The President touched only very lightly on questions of policy. This was quite correct, as coming from the engineer and technical head of a company. The duty of such a person he regarded as being to influence his Board of Directors, and not to make suggestions.

Financial Hardships.

Mr. R. G. Shadbolt (Grantham) remarked that he would not like the meeting to disperse without saying a few words—particularly seeing that Mr. Brearley was the occupant of the chair for the coming year. He had been associated with Mr. Brearley for a long time, and had seen him under many conditions so far as the gas industry and its working were concerned, and was pleased that he was President. He did not propose to touch upon any number of the varied topics the paper had raised. It was, he thought, an excellent form of discussion to bring about; and possibly every member in the room could add some useful remarks, or bring some practical ideas forward. The one point which he did desire to take this opportunity of emphasizing was in connection with the financial hardships now being suffered by gas undertakings. It was no doubt a very good thing that they should pat themselves on the back, and say after all their experiences, "We have not done so badly for the country, for the community, and for our employers." But there were such things as justice and injustice. It had become a matter of simple justice—nothing more, and nothing less—that the financial control of their undertakings should be modified to meet the altered requirements of the time. Briefly, he took it they might approach this question from two points of view. One was the increased cost of new capital which it might be necessary in the immediate future for them to raise as companies and as municipal undertakings. With regard to the municipal concerns, they might leave it to the people who were accustomed to advancing loans to see that they obtained such a rate of interest as was commensurate with the current value of money. Likewise investors in the form of share and stock holders would naturally, when looking round with amounts to invest, weigh the return to be obtained from gas shares and stocks with that from other industries. This was so far as the provision of capital was concerned. With regard to the existing shareholders, there was another phase of the question. In maximum dividend companies receiving pre-war dividends, they were first taxed, in

common with the community at large, to a much greater extent in regard to income-tax; and then, like the working man, they found it increasingly difficult to obtain the necessaries of their own particular lives. Why should not the argument which applied to the man who had labour to sell—either muscular or brain power—that it was more expensive to maintain himself, apply also to the class of people to whom he was referring? If the argument were applied to this problem, and once admitted, there would be ample ground on which an alteration in the financial conditions under which the industry worked could be brought about. He merely mentioned this point for the sake of ventilating it. If they approached the question from these two standpoints—the cost of the money that they might require to raise, and the injustice of the return on the money that had already been invested—they came up against the statutory limitation with regard to the price they might charge to the public for gas; and here they were drawn into the "vicious circle" of the increase in the cost of everything that the community required. They could not help it; and why should they be one of the very few industries excluded from participating, from the revenue point of view, in the altered value of money? If 5s. per 1000 c. ft. as the maximum price to be charged at a certain time was just, and the purchasing value of money had since been reduced by one-half, then the correct ratio would be double the standard price. This was, he knew, an extreme figure to take; but it was arguable. If justice was to be done to the gas undertakings of the country with regard to the capital they would shortly be calling for, and to existing shareholders with reference to the value of money, and the purchasing power of money remained anywhere near the point at which it stood to-day, then it was merely common justice—not sentiment, not a desire to break from their bargain—that adjustment should be made by the parliamentary authorities to meet the requirements of the case. The matter must be considered promptly, if anything useful was to be done. As one of the Committee engaged on the matter, might he say that the members of this Committee were working very hard to try, when the time arrived, to present the case to the authorities in such a way that what was asked should be acknowledged as merely justice and merely reasonable. If the members of the Association, in common with those who might read the remarks made at the meeting, would "put on their considering caps," and see how the financial situation from the various standpoints applied to their particular undertakings to-day, so that when later on they all met together they might be able to encompass the subject thoroughly, he thought no reasonable Government could refuse to consider the request of the industry, and, having considered it, could refuse to do their utmost to meet the case properly.

Experiences at Southend.

Mr. C. S. Shapley (Southend) related some recent experiences in his town which he rightly surmised would prove of interest to the members. In the course of his remarks, he referred to a holder of a million c.ft. capacity both inlet and outlet of which, after occurrences to which he had been referring, were absolutely blocked-up. He ran a steam-pipe over the holder inlet; and on the steam-pipe he put a few old lubricators, and had a man feeding them with paraffin. This cleared the inlet; but he was still bothered with the outlet, which he therefore treated in the same way as he had done the inlet. This very primitive method entirely got rid of the whole trouble. Everything was now normal; and the holder was quite all right. It was one that was built many years ago; and there was an accumulation of naphthalene in the inlet and outlet pipes, which was deposited in the very sharp bends at the bottom of the tank. Lately he had experienced a 25 p.ct. decrease in his gas consumption. That was to say, the figure had gone down from 17 p.ct. increase to 8 p.ct. decrease. He congratulated the President on the fact that he had gone so closely into the question of labour. It was very satisfactory to find that he had not any male staff in the meter-taking department. As to the 60 and 40 p.ct. deliveries of coal, he would suggest to Mr. Glover that this was a matter in which every case must be considered on its merits. With his own undertaking, they had an equal load summer and winter. Therefore they could do with equal deliveries; but certainly some people could not. They were not all building new works; and they could not be putting down coal-stores to meet the whims of the colliery people.

Meters and Pipes for Gas-driven Vehicles.

As to Mr. Terrace's remarks regarding gas-driven motor vehicles, they were doing a considerable business in this line at Southend. In one case he fixed up a 200-light meter, and restricted the outlet-pipe to 2 in., so that the meter should not be over-worked. For other filling-stations they had installed 100-light meters, and had restricted the outlet to 1¼ in. It was his intention to have these meters in and test them after they had been working a short time; and at the next meeting of the Association he would be very pleased to report to the members on the results of the tests, and to give his experience of how the meters behaved under these severe conditions. He would like to say that his experience with departmental officials during the war had been that he was subjected to a good deal of annoyance. An instance of this was quoted by him in connection with trouble in getting a petrol licence for a motor van purchased to replace two horse-drawn vehicles. The works at Southend, he went on to say, were arranged for delivery of coal by Thames flat-bottomed barges. They were not designed to get in coal by horse and cart, though this had to be done as a war measure. He was asked by the authorities why it was his coal stocks were so much less than last year; and he replied that it was in consequence of being shut out from the London Docks. Of course, they quite recognized that the munition works must take precedence; but all the relief then offered to him was five wagons of coal a day to the Great Eastern Station, which meant another two miles carting for him, at a time when he could not get horses and carts.

The Case of Non-Statutory Undertakings.

Mr. C. G. Grimwood (Sudbury) said he wished to draw attention to what was undoubtedly a very important point in connection with the financial hardships of gas undertakings. Stress had been laid by the President and by Mr. Shadbolt on the fact that, in dealing with these financial hardships, it was the statutory companies who were to be considered. Now as he (the speaker) was connected with more than one small undertaking, he naturally felt it was his duty to raise a little protest against the insistence on that word "statutory." Mr. Shadbolt had no doubt thrown some light on the matter, in his suggestion of a possible solution; but still he thought they would pardon him if he said that after all this was a little premature, because at present no one knew what solution would really be given to this question. He believed he might say that in their own Association more than half the members represented undertakings having no statutory powers; and if they took the total number of gas-works in the Eastern Counties, they would find that more than three-quarters of them were not statutory undertakings. One could realize that, not being statutory concerns, they were perhaps not entitled to any statutory benefits; but, at the same time, all the obligations connected with the war that had been imposed on statutory undertakings had been imposed also on the others. The limitations placed upon tar and sulphate of ammonia, and the lighting restrictions—these were burdens of which the non-statutory concerns had had to bear their share; and he could assure the members that they had fallen very much more heavily on some of the small works than they had on the larger undertakings. Perhaps they would say: "What business have these little concerns to take it in hand to supply a town or village with gas, without having authority from Parliament?" But one Act of Parliament at least said: "Those undertakings on whom has been imposed the obligation of supplying gas or have assumed that responsibility." Well, he was speaking on behalf of the little companies who had "assumed the responsibility." If there was any assistance to be given to gas undertakings in connection with the obligations that had been imposed on them during the war, he did feel that they should not insist too much on the statutory concerns, and on the idea that no one else was to have any benefit. If they looked at the history of many of the small companies who had not gone for an Act of Parliament or a Provisionol Order, they would find that fifty or sixty years ago members of the community held a meeting, and came to the conclusion that they would like to have gas, with the result that they formed a little company among themselves. Things had then continued to go along on very much the same lines. There had been no friction; and no reason had arisen to lead them to go to Parliament. They had perhaps satisfied their consumers as well as the statutory undertakings had done; and if there were any benefits to be secured, the smaller works should be included along with the others.

In Favour of Blue Water Gas.

Mr. W. W. Townsend (Colchester) said he would address himself shortly to war-time experiences and the quality of gas to be supplied in the future. He used to be a very strong believer in gas of fairly good quality, and straight coal gas. He did not believe in water gas. The last three years had, however, changed his opinion altogether. He found that the possession of water-gas plant had many advantages over having only straight coal gas; and it rendered the possibilities so much greater. One could adopt a mixture to suit the circumstances. He depended to a large extent on his water-gas plant; and he had found the drawbacks he anticipated practically non-existent. One could get a better duty, both from heating and lighting burners, with a mixture of water gas—either carburetted or uncarburetted. Of course, one had to be a little careful to mix it well. He remembered hearing of an irate consumer—not in his own town—who said he turned on the gas and applied a match, and all he got was a whistling noise without any light. He (Mr. Townsend) did not believe in supplying that sort of stuff. As was the case with so many other gas undertakings, the very high price of oil and its scarcity made it necessary to practise strict economy in this direction; and so he came down from 2 gallons to 1¾, then to 1, and finally to ½ gallon per 1000 c.ft., which he thought was about the limit. When Mr. Thomas Glover had made the suggestion—which he thought was a very good one in the national interest, and one for which the industry was indebted to him—that, from his own experience, one could use blue water gas, provided one's coal gas was of fairly good quality, he (Mr. Townsend) decided to try this, with varying proportions. He had for several months now been supplying the district with a mixture containing 25 p.ct. of blue water gas. His consumers were accustomed to good gas; and there had not been a single complaint. The quality was about 530 B.Th.U. gross; and they had never got down to 500 B.Th.U. They went in for tar-washing, but not oil-washing; and their system of carbonizing was very antiquated—hand-fired horizontal retorts. This was the point at which the question of the gas to be supplied in future came in. They were making about 11,000 c.ft. per ton by carbonizing. With a mixture containing 25 p.ct. of blue water gas this gave a total make per ton of 14,600 c.ft., of the quality he had stated. There was the cost of labour in making the blue water gas, which was not very heavy; and the sale of coke per ton was reduced by about 1½ cwt. They were producing with old-fashioned plant and the use of water gas a result which was as good as any high-temperature enthusiasts could get; and they were doing it without any great wear and tear. In fact, their wear and tear account was very light, as they did not go in for high temperatures. It seemed to him this was the direction in which progress was to be looked for in the future—making coal gas of decent quality, at a moderate temperature, getting good yields of ammonia and oils, and stretching it to get the required quantity by the addition of blue water gas. Here, of course, verticals had a great advantage over horizontals, whether fully charged or not. If one wanted to reduce the quality, and get a little larger make, it could easily be done by steaming the charge.

Meeting Difficulties.

Mr. Samuel Glover (St. Helens) expressed his pleasure at being with them at the meeting, and congratulated the President on the position he had taken up that afternoon, and the paper he had read. Unfortunately, he (the speaker) had not yet had an opportunity of going through the paper carefully, nor had he had the advantage of listening to the discussion. He would have liked to have heard what Mr. Shadbolt had to say on the subject of financial hardships of gas undertakings, because this was receiving attention—and quite properly so—in the interests of gas companies as a whole, by the National Gas Council. He thought the solution would be found in the direction of

allowing the usual economic law to take effect, and letting the consumer pay. From the evidence that he came across in different parts of the country, he believed that this was what it would come to; and he agreed with the President that the consumer was ready to pay such a price as was necessary in the circumstances for the gas with which he was being provided under such trying conditions. He hoped—and he thought he did not hope in vain—that they were not getting downhearted about their difficulties. These were, he felt sure, being met in the most efficient manner. There were, of course, various difficulties introduced by the circumstances of the war; but they were very much better off in this country than the Germans were from a gas-making point of view.

At this point in the proceedings there was an adjournment for tea in an adjoining room, where the meeting was afterwards continued.

The PRESIDENT said he was quite sure they had not exhausted the possibilities of discussion on the paper; but they must try to get through the remaining items on the *agenda*. He was not called upon to reply to the remarks that had been made. It was not really a paper, but a discussion introduced by him. So far, however, as any statement was required from him, he would promise that in his second "Presidential Address" he would make some reference to these points.

THE PRESIDENT THANKED.

Mr. W. B. FARQUHAR (Ilford) proposed a hearty vote of thanks to the President for his address, which had provoked an excellent discussion.

Mr. J. H. TROUGHTON (Newmarket) seconded the proposition, which was cordially passed, and acknowledged by the PRESIDENT.

REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

Mr. TOWNSEND said it was usual for the President for the time being to be the representative of the Association on the Council of the Institution of Gas Engineers; and he proposed that Mr. Brearley be appointed. They could not have a more fitting representative.

Mr. SHADBOLT remarked that it was a pleasure to second the motion, because, owing to the President's past experience on the Council, they could not have a better man to serve them there.

The PRESIDENT, in returning thanks, pointed out that he had already had seven years' service on the Institution Council. The work was intensely interesting to him; and he would try to represent as well as he knew how the interests of the gas industry in general and of the Eastern Counties Gas Managers' Association in particular.

BENZOL AFTER THE WAR COMMITTEE.

The PRESIDENT next moved the election of Mr. J. W. Auchterlonie, of Cambridge, as the representative of the Association on the Committee formed in connection with the marketing of benzol after the war. He was sure the subject could not be in more capable hands. They had heard earlier in the afternoon that, so far as the Eastern Counties were concerned, Mr. Auchterlonie's results in washing for benzol and toluol were the highest in the area; and he thought that if a man ever deserved reward, or deserved recognition, it was in this particular case. Mr. Auchterlonie had already attended the meetings of the Committee; and the Association wished him to continue.

Mr. C. F. VEEVERS (Northfleet) having formally seconded the proposal, it was unanimously agreed to.

Mr. AUCHTERLONIE thanked the members for the honour they had done him in electing him as their representative on the Committee. Unfortunately, he said, there were very few people who were going in for oil-washing. In connection with this subject, he did think the National Council ought to make representations to the Government, owing to the increased costs. He, at all events, was faced with a less price for his benzol. The price of sulphate of ammonia was limited; but he did not see that the price of benzol should be limited in the same way, because the Government were buying the benzol, and ought to pay the increased cost of producing it. It was, however, in connection with the marketing of benzol after the war that this Committee had been appointed.

Mr. SAMUEL GLOVER said the question of the price of benzol was coming up at the National Council, and they would see if anything more could be done.

The PRESIDENT remarked that, of course, the prices of sulphate of ammonia and benzol were linked-up with the financial hardships of gas undertakings. They did not care how they got relief, so long as they did get it. If it came by way of higher benzol prices, amending the sulphate price, and giving them greater freedom in regard to their parliamentary enactments, they would begin to feel more nearly satisfied. But the whole question was hanging fire; and it was time the Government got to know that the industry was very dissatisfied. He hoped no stone would be left unturned to let them know it.

THE COAL AND COKE SUPPLIES COMMITTEE.

The HON. SECRETARY (Mr. F. M. Paternoster, of Felixstowe) next read the following letter from Mr. W. G. S. Cranmer, the Hon. Secretary of the Midland Association of Gas Engineers and Managers, dated July 28:

> I enclose herewith copy of a letter I have sent to Mr. Walter T. Dunn, embodying a resolution passed by my Committee; and I was instructed to ask you to lay the same before your Committee at the very earliest opportunity, in the hope that, if approved of, they will take similar and simultaneous action.
>
> I believe the Council of the Institution meet on Wednesday next. This, of course, allows no time to call a meeting of your Committee; but possibly you may be able to get into telephonic communication with some of them, as any action, to be effective, must be immediate.

The resolution of the Committee was to the effect that—

> They were unanimously of the opinion that the gas industry should be represented on the Coal and Coke Supplies Committee; and that the Council of the Institution of Gas Engineers be requested to use their influence in this direction.

He said the letter came before the Committee; and they decided that they would not pledge the Association before placing it before the members.

The PRESIDENT said that he personally had a strong feeling that gas companies ought to be represented on this Committee, if it was not too late. The Committee, of course, was in existence; but, so far as he could see, there was nothing to prevent the Coal Controller from adding to it, if he so desired, or was shown that it was in the interests of the country so to do. He would like to have an expression of opinion from the members on the subject. There was just one point. The resolution was sent to the Institution of Gas Engineers. He wondered whether it should not have been sent to the National Gas Council, who would ultimately have to deal with it. However, if the Association passed a supporting resolution, they had better send it to the Institution, so as to keep in line with the Midland Association.

Mr. H. R. WIMHURST (Bury St. Edmunds) said it seemed to him the National Gas Council were the proper body; and if it would be any use sending the resolution to them, asking them to bring the matter to the notice of the Coal Controller, he would be very pleased to propose it.

The PRESIDENT thought they would have to adhere to the terms of the *agenda*, and decide whether or not they would give support to the Midland Association.

It having been formally proposed that the resolution of the Midland Association be supported,

Mr. TROUGHTON, in seconding, said it was necessary that they should have representation on any Committee dealing with coal. This at least was due to an industry which spent so much money on coal.

The resolution was unanimously carried.

Mr. SAMUEL GLOVER remarked that the matter had been dealt with by the Institution of Gas Engineers and by the National Gas Council. If anything was sent to the Institution which they regarded as a matter for gas engineers, they considered it in the first instance. There need be no fear in any case that things would not get to the right department, as the two bodies were working together in absolute harmony. The opinion expressed in the resolution just agreed to had been already passed on to the Coal Controller, and had received his consideration and the support of gas engineers associated with him. The Controller had suggested to the District Committees that at least when they were dealing with gas coal questions a gas engineer might be co-opted along with them, to help them to study the difficulties of the subject generally from the gas engineer's point of view. There was a difficulty at this date in getting gas engineers put on to the Committee as proposed; but if the District Committees would co-opt a gas engineer when they were dealing with gas-coal questions, this was all they need ask.

THE SCHEDULE OF PROTECTED OCCUPATIONS.

The HON. SECRETARY read the following resolution passed last May by the Wales and Monmouthshire District Institution of Gas Engineers and Managers, which was submitted by that Institution for the support of the Association:

> That the attention of the National Gas Council be drawn to the fact that in the Schedule of Protected Occupations just issued only those undertakings that are certified have any protection for their men who are necessary to carry on the manufacture and distribution of gas. Nearly the whole of the gas undertakings in England and Wales are either oil or tar washing their gas at considerable expense, to produce as much material required for high explosives as possible; and this meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers is unanimously of the opinion that the same protection should be given to the men employed in all gas-works, whether certified or not, and therefore calls upon the National Gas Council to take the necessary steps to obtain the inclusion of all gas undertakings in the schedule.

The PRESIDENT said they certainly ought to see whether anything had since been done to place uncertified works on the same basis as certified ones.

Mr. SHADBOLT pointed out that at the last annual meeting of the Institution of Gas Engineers it fell to his lot to propose a resolution that all gas undertakings should be placed on the same basis, and authorizing the Council to make representation to the Committee of the National Gas Council to press the matter on the authorities.

Considerable discussion on the matter followed, at the conclusion of which,

Mr. FARQUHAR said he thought the resolution before them was one which should be strongly supported, if nothing had yet been done; and he moved to this effect.

The HON. SECRETARY formally seconded the motion, and it was agreed to by the members.

PLACE OF NEXT MEETING.

The PRESIDENT said that, in the ordinary course of things, it had been the custom with the Association, as with others, to pay a visit if possible to the works under the control of their President for the time being. What would happen between now and next May, none could foretell. The war might or might not be over; but if it was over, and it was considered practicable for the Association to go as far as Longwood, they would be delighted to receive them there. His Directors at their meeting on the previous day had authorized him to say they would be very pleased to extend their hospitality to the Association, either at Longwood or elsewhere. Personally, he would very much like to have the members at Longwood. They had just opened new works; and so there would be something interesting to see. But it would probably involve a two-days' meeting, such as they used to have; and as they could not tell now whether a two-days' meeting would be practicable, he would suggest that the matter should be left in the hands of the Committee to decide. The members might at any rate settle now whether, failing Longwood, it would be their wish to meet in London or in the Provinces. It would not, he thought, be a bad thing to have the meeting (for a change) at Peterborough, or some other place central for the members, if Longwood should prove to be impossible.

Mr. SHADBOLT said they were the Eastern Counties Gas Managers' Association; and personally he felt they had been meeting at the

Southern extremity to such an extent that it was time they moved away a little. He knew of no better centre for the Eastern Counties as such than Peterborough. He moved that it be left to the Committee to decide nearer the time; and provided they were not able to go to Longwood, that it be a suggestion (without tying their hands too much) to consider having the next meeting at Peterborough.

Mr. FARQUHAR seconded this.

The PRESIDENT said his Chairman would have been pleased to come up to London that day and extend the invitation to the members personally; but he was in his 81st year (though otherwise hale and hearty) and so asked him (the President) to invite them on his behalf.

The resolution was agreed to.

THE DIFFICULTY IN SECURING NEW METERS.

The PRESIDENT remarked that there was still another item on the *agenda*—"Any other business." Had any member anything to bring forward?

Mr. AUCHTERLONIE said he did not know whether any of those present had made applications for new meters and fires; but he had had a notice quite recently that all applications for new meters and fires for new installations came within Category C. Those relegated to this category might have a very long time to wait. It was exceedingly awkward for statutory companies who had to supply meters. They could get them in Category B for replacements. It was a question the National Gas Council might also take up, and make representations to the Priority Committee that new installations—certainly for ordinary meters—should be placed under Category B. It was very awkward if people had to wait for an indefinite period for a supply of gas.

Mr. THOMAS GLOVER having furnished some useful information on the point,

Mr. SAMUEL GLOVER remarked that the electrical people appeared to be able to lay copper cables on premises already piped and receiving a satisfactory supply of gas. They ought to insist on a more equitable method of distribution of these metals.

Mr. TOWNSEND said he was granted a certificate for a number of meters for replacements; and they were also given a priority number for repairs to meters, which they could order as required. Meters for new consumers they were not allowed to have.

The PRESIDENT said this matter was a very serious one. If they could not supply new meters, the electrical people would come forward and find some means of supplying the people with electric light. If the Government thought it was so important to have the residuals from coal carbonization, it was a matter of great regret that departments should be at cross-purposes with each other. He moved—

> That the attention of the National Gas Council be called to the difficulty gas undertakings have in securing new meters, and that the Council be asked to exert their influence in attempting to secure a higher priority category for new meters.
>
> Further, that the attention of the National Gas Council be directed to the fact that electricity undertakings are securing priority certificates, not only for new customers, but for customers they are taking away from gas undertakings.

Mr. AUCHTERLONIE seconded this; and it was carried.

Mr. SAMUEL GLOVER said this would strengthen the hands of the National Gas Council.

Mr. A. L. CLARK (Maldon) pointed out that electrical undertakings could apparently get young single men exempted for wiring purposes. This was quite as important as the matter of material.

A VOTE OF THANKS.

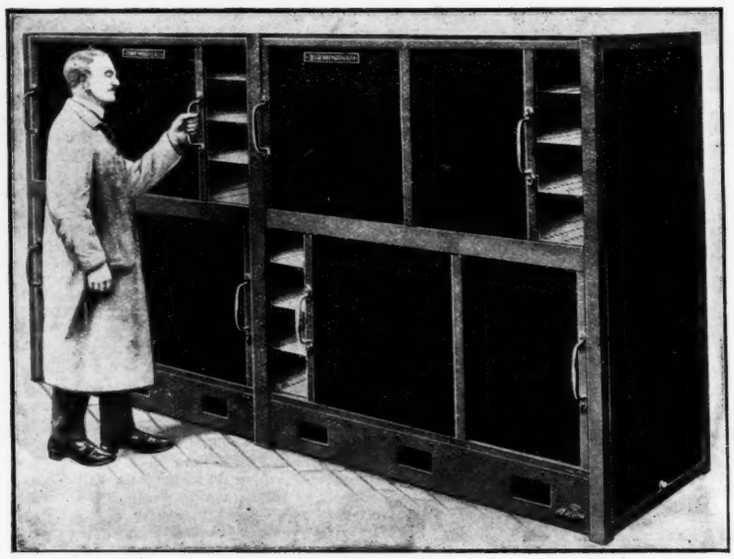
Mr. H. WIMHURST (Sleaford), remarking that he was an original promoter of the Association, proposed a vote of thanks to the President and officers. The meeting had, he said, been an excellent one.

Mr. H. G. RUGGLES (Leighton Buzzard) seconded the vote, which was heartily accorded.

The HON. SECRETARY, in the course of his acknowledgment, said this was one of the best meetings they had had—certainly during the period of the war.

The PRESIDENT expressed his obligation to the members for turning-up so well at the meeting. He was glad to see Mr. Wimhurst there, and trusted that, as one of the founders, he would be with them on very many future occasions.

TWO RECENT INTRODUCTIONS OF MESSRS. JOHN WRIGHT & COMPANY.



Wrought-Iron Hot Closet.

Sugar Boiler.

THE hot closet is specially effective for keeping served dinners hot, or for warming-up food which may be brought by workpeople in munition factories. The gas-heated sugar boiling apparatus is proving itself a very welcome and convenient apparatus in confectionery works, for the manufacture of sweets, toffee, &c. It is also suitable for the manufacture of large quantities of jams, jellies, and so on. The basin is shown being lowered by the attendant into its position. The heat is supplied by a high-power burner using gas at ordinary town pressure.

Use of Tar-Oil for Diesel Engines.

In view of the recent orders made by the Ministry of Munitions regulating the use of creosote and other oils produced from the distillation of coal, the Diesel Engine Users' Association have taken action to assist, as far as possible, in making arrangements for the necessary supplies of tar-oils to their members. The present difficulty of obtaining a sufficient supply of petroleum residual oil as fuel for Diesel engines has led a large number of users to adopt tar-oil. Difficulties have had to be contended with, as would naturally be expected, since the use of this class of fuel for Diesel engine work was limited before the circumstances brought about by the war created a demand for a suitable home product as fuel in place of the imported residual petroleum oil which had generally been used. With the more extended experience now being gained in several quarters, these difficulties are, however, gradually being overcome; and the discussion of the subject at a recent meeting of the Association was, "Engineering" points out, evidence of the wide interest which is being taken in this development of Diesel engine practice. At the present time "Creosote Licences" are only being granted for a period of two months; but the Association is hopeful that their members may shortly be able to obtain licences for the use of tar-oil for longer periods, so as to facilitate arrangements in making contracts for regular supplies. The Hon. Secretary of the Association has collected particulars of the requirements of the various members who use or who contemplate using tar-oil; and these, together with other information, have been submitted to the Director of Munitions Petroleum Supplies.

A general discussion on "Pyrometers and Pyrometry" will be held by the Faraday Society at the Royal Society of Arts on Wednesday, Nov. 7. The provisional programme includes an introductory address by Sir Robert Hadfield, Bt., F.R.S.

FUEL ECONOMY POSSIBILITIES IN BRASS MELTING FURNACES.

By L. C. HARVEY.

[Extracts from a Paper read at the Autumn Meeting of the Institute of Metals, Sept. 19.]

Fuel economy is a very engrossing proposition, and one as to which it is to be hoped that the future will furnish ideas and methods that will make past efforts in this direction appear very primitive and inefficacious. Until petroleum becomes available in bountiful quantities, and its price in consequence is brought down to reasonable limits, the only fuel to consider is coal. Now coal should be used as mined, in the furnaces direct, or else in gas-producers adjacent to the furnaces. The process of coking coal is only a means to obtain a clean, smokeless fuel, of intense heat value, at the expense of considerable wastage during this costly process of coke manufacture.

Though much thought and ingenuity have been expended during recent years upon the equipment of coal-consuming plants with more efficient types of boilers, fuel economizers, mechanical stokers, feed-water heaters, &c., with one ultimate end—the saving of fuel—in the brass foundry, it is still the general practice to melt metals in small uneconomical coke-fired crucible furnaces of the pit type, having heat efficiencies of only 2 to 6 p.ct. This is the range of efficiency for the general type of coke-fired natural-draught crucible brass melting furnace; and, unfortunately, more often than not it falls to the lower figure.

Assuming that the output of brass for fuse rod and cartridge strip during the war rose to 2,000,000 tons in 1916 for Great Britain alone, the amount of coke required to melt this quantity of metal in small pit furnaces of 5 p.ct. heat efficiency would have been 800,000 tons. This presupposes that the coke has a calorific value of 12,960 B.Th.U. per pound, and that 261 B.Th.U. are required to melt brass of (say) 70/30 mixture, and to superheat the alloy to 10 p.ct. above its melting point. In other words, the total amount of heat imparted to the metal would be 1,169,280 million B.Th.U., representing 41,714 tons of coke, which means that the balance of 758,286 tons of coke would be wasted in radiation and flue losses. This amount of useless fuel, at 35s. per ton, would cost £1,327,000, and the amount for 800,000 tons £1,400,000.

The relatively large capacity crucible tilting furnace had fortunately been developed during the ten years previous to the outbreak of war; and large plants of this type were immediately put down. So far was this the case that, taking into consideration the tilting furnaces existing prior to August, 1914, together with the new plants put down especially for war work, it can be accepted that, of the quantity of brass mentioned—2,000,000 tons for 1916—one-third of the total was melted in tilting furnaces. Now the average all-round working heat efficient of the coke-fired crucible tilting furnace on 70/30 brass is about 15 p.ct. If, therefore, the whole of this assumed 2,000,000 tons of metal had been melted in tilting furnaces, the amount of fuel used would have been reduced to one-third—say, 266,666 tons of coke, of which the heat value of 41,714 tons would have been imparted to the metal, and that of 224,952 tons of coke wasted in furnace and flue losses. In money, this would mean £393,666 spent on useless fuel in tilting furnaces, as against £1,327,000 in pit furnaces. On the assumption that 2,000,000 tons of brass were cast in 1916, of which one-third was melted in tilting furnaces, these plants were responsible for saving the nation approximately 178,000 tons of coke, having a total value of £311,500. This, however, is not the whole story, for the coke used in melting furnaces has to be made from coal, in which process there is a further wastage. Gases and volatile constituents in coal which could be utilized in the melting chambers of furnaces are lost in the coke-ovens.

That "metallurgical" or "foundry" coke is necessary for all cupola work is undisputable; but this high-grade fuel for brass melting is not essential if systems can be modernized and improved so that coal can be used direct instead of having first to convert it into coke. This can be done in two ways, by using:

(*a*) Powdered coal, which is the most efficient way of using solid fuels.

(*b*) Unscrubbed producer gas—a compromise, but still a more or less direct application of solid fuel.

The first system is the ideal one, resulting in no loss of heat prior to burning in the furnace. The second method is a convenient one where large plants are concerned; but it is not so readily applicable to the small foundry. In any case, there are producer losses which are absent in the first system. These losses, however, probably counterbalance the energy required to grind coal to the powdered state. Powdered coal can be applied and burnt as readily as liquid fuel or gas; and it has many of the important advantages of these fuels in so far as running costs for crucibles, linings, labour, &c., are concerned. As is well known, these costs are much below those for coke-fired furnaces.

Referring, again, to the figures mentioned above, we will consider what this means in quantities and cost of coal, if used direct in powdered form. For the 2,000,000 tons of brass, if melted in pit furnaces, 800,000 tons of "metallurgical" or "foundry" coke were required. In terms of coal, this would mean about 1,143,000 tons of coal, of which approximately 1,083,265 tons would be mined only to be wasted in radiation and flue losses. On the other hand, if crucible tilting furnaces had been used entirely, the overall amount of coal burnt as powdered coal, leaving the efficiency of the furnace still at 15 p.ct., would have been approximately the same as the figure given for coke—viz., 266,666 tons, or a saving of 733,334 tons of coal for 1916, if the powdered coal system had been available.

During the past three or four years town gas has been very successfully employed in crucible melting furnaces from the standpoint of cleanliness, convenience, and especially life of crucibles, viewed from which this system has many important claims. But as a fuel economizer it has none. Let us briefly consider this question on similar lines to those followed in the case of coke-furnaces. The overall working efficiency of small gas-fired pit type crucible furnaces is approximately the same as for the larger tilting type, and can be taken at 15 p.ct. Assuming the calorific value of it to be 550 B.Th.U., then 2126 million c.ft. of gas would be required to melt and superheat the 2,000,000 tons of brass. In pit furnaces as well as in tilting furnaces the total amount of gas burnt for this quantity of brass would have been 14,336 million c.ft. In terms of coal, assuming 1 ton to yield 12,000 c.ft. of gas, this would mean approximately for either the pit furnace or tilting furnace 177,166 tons used for useful purpose and to produce 106,000 tons of gas coke, and 1,194,666 tons of coal wasted in heat radiation and flue losses, and the production of 717,000 tons of gas coke.

It will therefore be seen that, apart from leakage in the gas-mains, which may be considerable, pit furnaces and tilting furnaces take a maximum quantity of 1,371,832 tons of coal as gas; 1,143,000 tons of new coal as coke (800,000 tons of coke), at a value of (say) £1,143,000 (taking coal at £1 per ton), or £1,400,000 as coke (at 35s. per ton). On the other hand, tilting furnaces would take 380,951 tons of new coal as coke (266,666 tons of coke), at a value of £380,951, against 1,371,832 tons of coal for making gas—60 p.ct. gas coke production would equal 823,300 tons of this bye-product, which can be re-used in gas producers. These costs, however, bear a more striking significance if they are considered in relation to the usual price of gas at figures charged for town supply. Say that this is 2s. per 1000 c.ft., then the cost alone for melting the 2,000,000 tons of brass would be £1,433,600.

The suggestion therefore arises that gas, if used, must be produced upon the site, as producer gas. Producer gas cannot be economically generated for very small plants; but for the larger capacity melting furnaces, even when only one or two units are installed, the producer gas system presents a very convenient arrangement. I believe a simple and efficient producer for small melting plants will shortly appear upon the market. Assuming, for the sake of argument, that producer gas had been used for melting the 2,000,000 tons of brass, the following figures show the approximate costs of this system. Brass can be melted with a consumption of about 20 c.ft. of 135 B.Th.U. gas per lb. of brass in tilting furnaces, and with about the same gas consumption in multiple crucible pit furnaces (it is no use at all considering single crucible pit furnaces for low-power gas). For this low-power producer gas, 1 lb. of coal will yield (say) 60 c.ft. of gas; so that the quantity of coal required for pit and tilting furnaces would be about 660,607 tons, costing £666,607 for fuel alone to melt and superheat the brass, and 10 p.ct. at least can be added for losses in the producer, which brings the coal consumption and value to 733,267 tons and £733,267. Thus there is a virtual saving of, roughly, 40 p.ct. in the quantity of coal, and 50 p.ct. in the cost of fuel when the gas is made in producers instead of being taken from the town mains.

Approximate Relative Heat Values and Flame Temperatures of Fuels.

—	Heat Value of Cold Gas or Fuel.	Theoretical Maximum Flame Temperature.	
		Air at 0° C.	Air at 300° C.
		Deg. C.	Deg. C.
Coke producer gas (B.Th.U.)	143 gross / 136 net	1600	1700
Dowson soft coal gas	148 gross / 139 net	1600	1700
Mond soft coal gas	159 gross / 145 net	1530	1630
Wood producer gas	161 gross / 153 net	1600	1700
Richéwood retort gas	385 gross / 349 net	1860	1990
Anthracite producer gas	173 gross / 161 net	1670	1780
Water gas	317 gross / 294 net	2030	2160
Town gas	600 gross / 550 net	2000	2100
Metallurgical coke	12,960 B.Th.U. per lb.	2090	2250
Bituminous coal	14,000 " "	1990	2160
Petroleum (water free)	19,700 " "	2160	2310

From the point of view of overall working heat efficiencies, there is not much to choose between crucible tilting furnaces for any class of fuel—coal, coke, oil, town gas, or producer gas—if the most economical size and type is taken for each fuel. Where pit furnaces are concerned, however, there is a very marked difference; and those fired by means of town gas at present hold the palm. But the real question remains still unsolved—viz., how to

utilize the major portion of the heat units contained in fuel. The satisfactory application of powdered coal certainly offers an alluring proposition.

Discussion.

Mr. S. N. Brayshaw said he thought Mr. Harvey was a sensible man, until he found out from the paper that he had got his knife into gas. It was an unprovoked assault; and he did not say this because he had any special interest in gas. It was true that millions of feet of gas went through Brayshaw burners every week. But he was also interested in solid fuel and producer gas as well; so that he was not biassed. It seemed to him obvious that gas could be burned a great deal more efficiently than coal, whether coal was powdered or not. Gas lent itself to greater efficiency by reason of smaller space occupied by the furnaces and smaller losses by radiation. It also lent itself to recuperation, which coal did not. They could not pre-heat coal to any very great extent before putting it on the furnace. Apparently, the author thought there was a good time coming when all coal would be burned in this powdered form, and there would be no gas-works—or rather that gas-works would be run for the bye-products; the gas being the bye-product.

Captain Bengough drew attention to the point in the paper where it was stated that 261 B.Th.U. were required to melt 1 lb. of 70/30 mixture, and to superheat the alloy to 10 p.ct. above this temperature. What was meant by superheating the alloy 10 p.ct.? He could understand superheating so many degrees; and he would like to know exactly what the author meant by this. Where did he get the figure of 261 B.Th.U. to melt 1 lb. of brass? He did not know of any direct experiments that had been made to determine the absolute amount of heat required to melt 1 lb. of brass or copper, or any of the non-ferrous metals. Before the efficiency of the furnaces could be determined, it was necessary to know how much heat was really required to melt 1 lb. of metal. At present, the only data bearing on this matter were data for the specific heats of metals; and the amount of heat required to melt a metal had to be worked out from this, which was rather an intricate calculation. He himself had made it, and found that, instead of 261 B.Th.U., it was 230 B.Th.U. In conjunction with the late Captain Gillies, he had made an apparatus which it was hoped would give an absolute figure for the amount of energy required to melt 1 lb. of copper. The work, however, had been stopped. But if anyone else would care to take it up, he would be only too pleased to place at their disposal the results of what he had done so far.

Mr. H. M. Thornton has, since the meeting, forwarded the following notes of what he had intended to say on the paper the discussion on which was unfortunately cut short owing to lack of time.

Mr. Harvey in his paper brings forward some points of rather far-reaching effect; and it is questionable whether he is at all justified in adopting the basis of calculation which he has done, as he says his object is to consider the question from the standpoint of conservation of coal supplies. Is he justified in proposing that coal shall be burnt directly for any purpose at all? The industrial development of this country is inseparably bound up with its resources of high-grade fuel, necessary for the production of mechanical, thermal, or chemical energy. When it is borne in mind that in Norway—a country only a few hundred miles distant—electrical energy is regularly produced and transmitted at a charge not exceeding £2 per electrical H.P. year of 8760 hours, the competition which this country may experience in the future can be imagined.

Coal users throughout the world have often regarded this material solely from the point of view of a fuel. Nevertheless, realization is growing, even among the masses, that it is possible to obtain from coal materials of importance for other purposes; so it is rather surprising that Mr. Harvey should have taken his somewhat limited view of the matter in considering this question. For example, the contention that the process of carbonization for the manufacture of coal gas cannot show any economies from the standpoint of conservation of coal supplies does not appear to be borne out by a critical examination of the analysis drawn up by Mr. Harvey. Rather, in view of the comparative results obtained, is there not some reason for asking whether there is any justification for regarding our natural fuels merely as sources of thermal energy.

While the author takes cognizance to some extent of the coke produced in carbonization, he would appear to have overlooked the other bye-products which gas-works practice yields; and these are neither few nor unimportant in peace time, but are essential to the nation in time of war. As I pointed out in my lecture at the Royal Society of Arts in April last—in view of the figures I then gave of the coal reserves of the principal commercial countries, and the conclusions of the Royal Commission on Coal—the most economical use of our remaining supplies is a very practical and urgent question.

I do not wish to express any view in regard to the merits of the particular process of carbonization now in vogue for the preparation of town gas. Nevertheless, I feel that the case for carbonization, or some similar preparation of natural fuel, prior to using it as a source of heat energy, is universally recognized. Gas-works coke is not ideal for all industrial operations; but, on the other hand, there is an increasing demand for this fuel for employment in metal-treating furnaces. The semi-producer type of furnaces are, for example, very largely used in muffle and open-flame furnaces for the heating of steel billets. Producer gas finds a vocation in furnace heating with much success where adequate regeneration or recuperation is ensured; and, of course, the production of this producer gas need not involve the utilization of raw fuel.

The subject is obviously one which cannot be adequately discussed in a brief communication. My object is merely to draw attention to the fact that there are factors, apparently ignored in Mr. Harvey's analysis, which are of great importance in any consideration of the economical bases of the use of any particular type of fuel.

One other point. The author states that the reverberatory furnace is thermally of low efficiency. I think this statement will not receive universal support. If the furnace be used only intermittently, the best results from the point of view of fuel consumption are not to be expected; but it is generally realized that, viewing the question solely from the thermal standpoint, open-flame furnaces should be capable of giving better results than fuel furnaces using crucibles. By this statement, it is not meant that the open-flame furnaces on the market are necessarily more efficient than particular designs of crucible furnaces, which have, especially in this country, been very considerably experimented upon in recent years, but that it is easier to transmit thermal energy to the metal with direct flame-contact than when this does not occur.

Mr. H. Hartley, M.Sc. (Richmond Gas-Stove Company), writes: The basis of Mr. Harvey's remarks appears to lead to rather a circumscribed view of the question of fuel economy as affected by the different systems of heating metal-melting furnaces; and I should like both to add somewhat to his remarks, and to extend his method of analysis in the case of three of the systems.

Powdered Coal.

According to the author, this particular type of appliance is capable of giving the highest overall fuel efficiency; the thermal efficiency of the furnace being 15 p.ct. It is generally conceded that powered coal as a fuel is only practicable for large installations, as it would probably not pay to put in a coal-milling plant for the small amount of fuel used in the ordinary brass foundry. It has been reported that, by the adoption of this form of fuel, a saving of 15 to 20 p.ct. would obtain, as against that used in direct-firing by means of coal in a reverberatory furnace. Hitherto certain troubles have been incorporated with this system of firing, due to the clogging of flues with ash and the fluxing action of this ash on the refractory linings—a trouble which is to be anticipated in crucible furnaces fired in the same manner, and which would be very liable to cause a marked erosion of the pots. It is conceded that the fuel can be burnt through a nozzle or burner in a manner very similar to gaseous fuel, and that a certain amount of control of the atmosphere in the furnace can be obtained without much difficulty. The use of powdered coal would also appear to have advantages which would commend it for open-flame furnaces owing to the possibility of utilizing low-grade fuels which it might not be possible to employ successfully even in a gas producer. Mr. Harvey does not refer, however, to these possible advantages, but appears to demand a constant quality of coal for all the types of furnace which he discusses. He appears to make no allowance for the fuel consumption necessary for the preparation of the coal, nor is he concerned at all with the question of the additional charges for labour in handling, storage, ash-removal, &c., in connection with solid fuels. He mentions that the loss in the producer system counterbalances the energy required to grind coal to the powdered state; and the producer loss he puts at 10 p.ct. A similar allowance then for the preparation of the fuel would reduce his overall efficiency to 13½ p.ct. Thus from the coal there is obtained by this system about one-seventh of the total available energy; and there are no bye-products with which to credit the system.

Town Gas Fuel.

An arithmetical error has I think crept into his estimation of this. The figure for total gas burnt should read 14,173 million c.ft., instead of 14,336 millions. This being so, the Harvey ratio in that case becomes 1 to 28·3; and on making allowance for the coke obtained at the gas-works the ratio becomes 1 to 11·3. If on the other hand a balance-sheet is drawn up showing the yield from each ton of coal carbonized, the position of town gas is found to be much more favourable than as indicated by Mr. Harvey.

The attached balance-sheet, drawn up from the author's data, shows little difference between powdered coal and town gas, both of which would appear to be preferable to the producer gas system if Mr. Harvey's premises are correct.

FUEL BALANCE-SHEET FOR THE THREE SYSTEMS.

Dr. (For Each System.)

1 ton coal of 12,960 B.Th.U. per lb. = 29·03 million B.Th.U.
(Capable of melting 111,238 lbs. of brass at 261 B.Th.U. per lb.)

Cr. (Powdered Coal.)

(Gross efficiency, 15 p.ct. Net efficiency, 13·5 p.ct.)

		Lbs. of Brass.
Thermal energy usefully employed . . . . . capable of melting	= 3919 million B.Th.U.,	15,016

Cr. (Coal Gas.)

11 cwt. coke, 12,000 B.Th.U., per lb.	= 14,784,000 B.Th.U.	
*Employed in tilting furnace of 15 p.ct. efficiency would melt	..	8,498
16 gallons tar, 171¼ lbs. at 20,000 B.Th.U. per lb. . .	= 3,425,000 ,,	
Employed in oil furnace of 15 p.ct. efficiency would melt .	..	1,968
10,800 c.ft. gas at 550 B.Th.U. net per c.ft.	= 5,940,000 ,,	
Employed in gas furnace of 15 p.ct. efficiency would melt .	..	3,414
Total	24,149,000 B.Th.U.	would melt 13,880
Plus—	35 lbs. ammonium sulphate 4·5 ,, sodium ferrocyanide.	

* This fuel does not commend itself generally for such furnaces; but is a recognized source of energy for other heat treatment processes which enable the above thermal efficiency to be obtained.

Cr. (Producer Gas.)			Lbs. of Brass.
(After Harvey). 60 × 2240 c.ft. gas of 135 B.Th.U. . .	=	18,144,000 B.Th.U.	
With a furnace consumption of 20 c.ft. per lb. brass would melt		..	6,720
If we assume—			
75 p.ct. producer efficiency, then heat value of gas . .	=	21,772,500 B.Th.U.	
With furnace efficiency of 10 p.ct. would melt . . .		..	8,342
15 gallons of tar, 160½ lbs. at 20,000 B.Th.U. equals . .	=	3,210,000 ,,	
Employed in oil furnace of 15 p.ct. efficiency would melt		..	1845
Total		24,982,500 B.Th.U. would melt	10,187
Plus—		85 lbs. ammonium sulphate.	

For every ton of coal put into the retort there are obtained, after deducting the coke necessary for the heating of the settings, 11 cwt. of gas coke, 16 gallons of tar, 35 lbs. of ammonium sulphate, 4·5 lbs. of sodium ferrocyanide, and about 12,000 c.ft. of coal gas. Deducting 10 p.ct. from this latter figure for leakage in transmission, there is then available 10,800 c.ft. of gas. For the sake of comparison with the other two systems on the heat basis adopted by Mr. Harvey, a balance-sheet which I have drawn up shows the yield of molten brass which could be obtained if the whole of the combustibles available on carbonization were employed for the melting of brass with furnaces of the efficiencies cited by the author.

Producer Gas.

It is not quite clear whether the author has in mind the semi-producer type of furnace or an appliance involving a producer as a separate entity. In view of one statement he makes, it would appear that he is referring to the latter type. If one considers the data published in this connection by Mr. Harvey, some peculiar figures are arrived at, which, if correct, deserve more emphasis than they have received.

The producer efficiency is presumed to be 90 p.ct., and the gas consumption figures show a furnace efficiency of 9·7 p.ct.; so that the overall fuel efficiency is 8 p.ct., and the Harvey ratio becomes 1 to 11·5.

It is stated that 60 c.ft. of gas of 135 B.Th.U. per c.ft. are obtained per lb. of coal gas fired. The total heat value of the gaseous fuel is thus 8100 B.Th.U. With a producer efficiency of 90 p.ct., this means that the calorific value of the coal employed is only 9000 B.Th.U. per pound. In this event, why debit the system with a fuel charge of £1 per ton when the other systems employing coal of 13,000 B.Th.U. are only debited similarly with £1 per ton? To make the gas data quoted agree with the 13,000 B.Th.U. fuel discussed under the other headings would involve a producer efficiency of 62 p.ct. On this basis, the overall efficiency of the system becomes 6·2 p.ct.; and the Harvey ratio 1 to 16.

If, on the other hand, we assume a large producer plant supplying several foundries, with a producer efficiency of 75 p.ct., there would be a yield of 82 to 85 lbs. of ammonium sulphate and about 15 gallons of tar per ton of coal gasified; and the overall fuel efficiency of the system would be 7½ p.ct. For efficient working, the melting furnace would have to run continuously, and adequate regenerators would be required. If the producer were run solely with a view to producing the best gas for metal-melting furnaces, and the steam saturation of the blast was reduced accordingly, a somewhat higher yield of molten brass would result, with a smaller quantity of sulphate.

THE PRODUCTION AND PREVENTION OF NAPHTHALENE.

By Thomas D. Miller.

[From the September Issue of the "American Gas Institute News."]

Naphthalene Prophylactic.—A Suggestion.

In the proselytizing work which has engaged my attention the past four-and-a-half years, I have advocated the use of high heats in coal carbonization with heavy charges burned a sufficient time to completely extract the gas from the coal. The objection offered to the high heats in many instances was that standpipe and naphthalene troubles would result. In a majority of such cases, I was permitted to make a demonstration of the correctness of the theory that these evils would not follow the use of temperatures of from 2000° to 2100° Fahr. in the retort, provided the charges were heavy—*i.e.*, from 475 to 500 lbs. to a 16-in. × 26-in. × 9 ft. retort. In every plant where this trial was made, the expected troubles with standpipes and naphthalene did not materialize, and the plants continued to operate along these lines for months, and some that I am familiar with for three years or more, without any manifestations of naphthalene or unusual standpipe troubles. This confirmation of theory as to these results led to a further study of the subject and the compilation of this paper.

The most important step in the treatment of any disease is the diagnosis. Once determine the cause of the trouble, and successful treatment will result from eliminating the cause. The presence of naphthalene in coal gas seems to have been considered in the past as unavoidable, and at one time as desirable. When naphthalene troubles began to manifest themselves, the production of the excess was attributed to high heats primarily, and attention was given to the elimination of naphthalene rather than to methods of carbonization which would prevent the formation of this excess. As high heats were desirable—in that greater economies were obtained by their use—the excess naphthalene was accepted as a necessary evil, and was treated as such.

An inspection of the proceedings of the various Gas Associations discloses the fact that a great deal has been said and written about naphthalene and stopped standpipes. There appears to be a rather close association between these two manifestations; and, undoubtedly, in the solution of the difficulties attendant on these troubles, the basic causes have been overlooked in many instances, and temporary expedients resorted to for temporary relief. This too often leads to erroneous conclusions, and coincidental conditions have often been assigned as causes.

It must not be supposed that this paper is intended to be a complete exposition of the causes of, or remedy for, these troubles, but was compiled in the hope that the conclusions as to the source and cause of the troubles might offer suggestions as to prophylactic practice.

In the making of a diagnosis of this trouble, the order of investigation was:

1. What constituents go to make naphthalene?
2. Under what conditions do these constituents form naphthalene?

Pursuant to collecting data, the literature on the subject was canvassed, and many inquiries were made of men whom it was thought might have made investigations looking to the desired conclusions. While the search and inquiries did not disclose positive and conclusive experimentation, as to the first item, the consensus of opinion was that any of the hydrocarbons of coal gas or carburetted water gas were convertible into naphthalene. [See Appendix.] As to the second item, all appear to agree on the one point—that the formation of naphthalene is not a direct result of high temperatures in carbonization, but a secondary result of the heating of the gas after its generation; that all the hydrocarbons are susceptible of being cracked into naphthalene, or more complex compounds, if heated to varying temperatures for a sufficient time.

Some of the more tender hydrocarbons seem to be more readily broken-up than others; and this undoubtedly suggests in part an explanation for the tendency of some coals or oils to produce more naphthalene than others under the same treatment.

A coal or oil that distils readily at low temperatures will undoubtedly produce a gas more susceptible to alteration at higher temperatures than the gas from sources requiring higher temperatures for distillation. As the breaking-up process in superheating the gas, if carried to a sufficient extent, will cause the dissociation of the carbon and hydrogen (resulting in copious deposits of soot), any process or modification of a process of distillation which tends to reduce the formation of naphthalene will likewise tend to a reduction of soot, which is the basis of stopped standpipe troubles. The presence of an increased percentage of soot, or free carbon, in tar reduces its market value; and any improvement in carbonization methods which will reduce the formation of soot will tend to improve the quality of the tar.

The formation of excessive naphthalene in water gas practice can be brought about by excessive heats in the superheater, and it may be reduced to normal conditions by merely decreasing the heats. As superheater temperatures can be controlled, the production of naphthalene in water-gas practice may be kept thoroughly in hand.

Since naphthalene is a result of the cracking of the less complex hydrocarbons, the greater proportion of naphthalene should be formed in coal-gas practice during the earlier period of carbonization (when the production of the rich gases is greatest) and during the period before the body of the coal has become an incandescent mass. This final cracking of the gas occurs as it passes along the space at the top of the retort when in contact with the hot top. At this particular time, the top of the retort is the hottest part of it. As the heat of the sides and bottom is being absorbed by the coal, the top remains at a higher temperature throughout the period, and attains the maximum temperature of the retort.

All experience seems to indicate that, while vertical retorts make some naphthalene, at no time do they produce a sufficient quantity to cause trouble at the plant or in the street-mains or services. This seems to be explained by the fact that the passages by which the gas leaves the body of the coal and the hot part of the retort are exceedingly small; consequently the rate of flow of gas is very high, and the time of its exposure to the temperature of the surrounding walls of the retort or the body of the incandescent coke is not of sufficient duration for it to attain the critical temperature, and thereby passes from the hot retort with only a small percentage of it having been broken-up into naphthalene.

The cracking effect of various temperatures seems to be in inverse ratio to the time of exposure—*i.e.*, gas exposed to a low temperature for a certain period will have the same effect as if exposed to a higher temperature for a shorter period. This is the exact problem to be solved in the spacing of chequer bricks for the carburettor and superheater in a water-gas set—the important elements in its solution being the character of the oil used and the rate of "make," as well as the temperature which is to be carried.

The effect of the time-element of exposure to high temperature is very aptly illustrated in horizontal machine-charged through

retorts, where the retorts are practically filled with coal. In one installation with 16 ft. retorts the percentage of illuminants runs 1 p.ct. higher than the gas produced from a precisely similar installation with 20 ft. retorts, operated at the same temperature with the same coal charged with the same amount of coal per foot of retort.

Carbonization at low temperature can be so conducted that there will be a practical absence of naphthalene. The gas production will be small and the crude tar production will be large. On increasing the temperature of carbonization, the gas yield will increase and the tar yield will decrease. If this increasing yield of gas could be conveyed from the retorts without subjecting it to the cracking effect of the higher temperatures, the production of naphthalene would remain practically *nil*. Therefore, any system of carbonization which approaches this condition will produce coal gas free from naphthalene in just the ratio of its nearness to the ideal condition.

A certain amount of heating of the vapours of distillation is necessary to bring many of these vapours to more gaseous stability, and the proportioning of the time of exposure to the temperature of the generating chamber is the problem. The time of exposure must, of necessity, be reduced as the temperature is increased.

In the operation of horizontal retorts at high temperatures, the nearer full the retorts can be charged, the nearer this ideal condition is approached. In hand-drawn retorts the limitation is the necessary space over the charge for the inserting of the drawing tool. The inclines can approach even nearer, while the verticals come nearest to the ideal condition. Construction of the carbonizing chamber, of whatever shape, which would make possible the control of temperature of the portion through which the gas flows to the off-take pipe, would be a decided help in preventing the formation of naphthalene and soot. It is to be expected that better gas results will be obtained from slot chambers, where the top and upper part of the side walls of the carbonizing chamber are maintained at a lower temperature than the portion in contact with the coal.

The desirability of carbonizing at high temperatures being apparent, the conclusion is obvious. In order that the gas may be taken from the carbonizing chamber without undue superheating, the conveying space for the passage of the gas should be reduced as the temperature is increased, in order to secure an increased velocity of the gas in its passage to the off-take pipe.

The enforced increase in the carbonizing period will not reduce the production of the setting, but, on the contrary, will increase it through the higher yield obtained, while the heavy charges improve the quality of the coke and the decrease in production of lampblack improves the quality of the tar.

APPENDIX.

A—An opportunity offered to make a comparison between the amount of naphthalene and benzene yielded by a certain sample of coal, which was being examined with special care. When this coal was distilled in the laboratory apparatus to make a sample of gas, the amount of naphthalene and benzene found in the gas made at the gas-works from the same coal showed a discrepancy. When it was worked-back, the fact stood out as plainly as any fact could that more than 65 p.ct. of the benzene which was present in the gas made in the experimental apparatus had somehow disappeared, and that there was more naphthalene in the gas than could be accounted for, even allowing that the lost benzene had all gone to make naphthalene.

It is but a fair inference, from general experience and the loss of available benzene, to say that somehow and somewhere in the process of gas-making two benzene rings are broken-up, and that the residue, the broken rings united, so far as they remain coherent at all, form the naphthalene fetter.

Opinion is held by men most familiar with the chemistry of the question, that the cause of naphthalene nuisance is to be found in the fact that the products of distillation remain for too long a time, relatively a very long time, in contact with the retort walls.

B—Naphthalene is borne in the retort by exposure of the nascent gas to a high temperature long enough to have it assume the breaking-up of some of its heavy vapours. It is worth remarking that the production of naphthalene is not directly a function of the degree of heat employed in the bench, but rather of the temperature the gas has to assume before leaving the retort. Thus it happens that works running with comparatively high heats in their retorts—say, 1800° to 1850° Fahr.—do not make as much naphthalene, and suffer less from it, than others running at 100° Fahr., more or less, because in the first instance the retorts were receiving full, even, and regular charges, while in the other case through lack of discipline, of good help, or exigencies of the demand for gas, charges were frequently too light, unevenly put in, or missed altogether.

C—There is no doubt but that naphthalene troubles are greatly reduced by charging the carbonizing chambers as full as possible.

D—I have no information as regards which hydrocarbon or group of hydrocarbons is broken up by heat and changed into naphthalene. It is a complicated reaction, and probably is affected by some catalytic action; so that it is almost impossible to hazard a guess on what the cause is.

E—I have consulted with Dr. Wing in relation to this matter, and he informs me that no particular hydrocarbons break up into naphthalene when superheated, but the formation of naphthalene can be produced from any of the hydrocarbons when heated to the right temperature.

F—A large number of hydrocarbons all the way from methane to benzol will break-up, yielding naphthalene (among other products) under the action of higher temperatures. This change does not seem to be the result of a definite and exact temperature, but any temperature which will be high enough to decompose these substances will result in the formation of more stable compounds, of which naphthalene is one.

G—We know that the formation of naphthalene is in part a function of the contact of the gas with the hot coke, and in part probably a function of the kind of coal used, as well as a function of temperature. It is probable that any of the hydrocarbons will produce naphthalene if heated to a sufficient degree. They ultimately break-down first into acetylene or some of the simpler hydrocarbons and then build-up the more complex ones from these.

H—In connection with the formation of naphthalene in vertical retorts, I would say that we have an installation on the Glover-West system of continuous vertical retorts at Fitchburg, which has been in operation for about five years, and also some in Springfield which have been in operation for a year or two. As far as our experience has gone with these retorts, the indications are that no naphthalene is formed. This is probably due to the fact that there is a cold zone of coal down through the retort, and the gas generated passes up through this cold zone to the top of the retort, where the take-off pipe is located. In this way, the gas is not subjected to any action of heated retort walls or hot coke.

The tar obtained in these vertical retorts indicates carbonization at low temperatures. It is very fluid and has a sort of brownish colour and a very low content of free carbon—the amount being about 2 p.ct. We have made distillation tests on this tar, and have taken the oils that distilled over, and chilled them down to a very low temperature, but were unable to find any naphthalene. The sulphur in the gas in the form of carbon bisulphide is less on a given coal when used in vertical retorts than in the same coal when carbonized in horizontal or inclined retorts. This also indicates low heats. An analysis of the gas, however, made in the vertical retorts showed a very high content of hydrogen; the amount being at least 50 p.ct. on an average and in some instances reaching as high as 62 p.ct. The hydrocarbons average around 2 p.ct. These figures would indicate high heats.

These two facts seem to contradict one another; and the opinion of gas engineers seems to differ regarding the reaction that takes place in the retort. Some believe that the gas when made goes toward the centre of the retort, and passes up through the zone of uncarbonized coal and thereby is not subjected to the influence of heat. Other engineers claim that the coal, when it begins to carbonize, forms a thick pitch-like mass which prevents the gas from going toward the centre, and forces it out to the sides—making it travel up around the sides of the retorts and the coke, thereby subjecting it to heat from the retort walls.

The tar we get from the inclined retorts at Malden, and also from those at Springfield, contains an appreciable amount of naphthalene; but, as stated above, we have had no serious trouble from the naphthalene in the gas.

In the operation of the water-gas machines, if the oil is cracked at a temperature of 1500° Fahr. or more, we notice naphthalene deposits in the purifying boxes. It can be seen in the purifying material itself; and it forms on the cover of the purifying boxes. We aim to crack our oil at about 1400° Fahr.

It is my opinion that any group of hydrocarbon compounds that are of a mineral origin—such as petroleum or coal—will form naphthalene if heated to a sufficient degree.

I—I regret that no chemical tests have been taken at our coke-oven plant which would in any way throw light on the questions; and I doubt if any reliable tests have been made anywhere.

Judging from my experience in various places, I feel sure that with a properly designed condensing and scrubbing plant, the naphthalene can be removed to such a point that not a sufficient amount will remain in the gas to saturate it at ordinary temperatures. There is no doubt that naphthalene is produced when the gas comes in contact with a highly heated body, such as the top of a retort or coke-oven. I imagine, if the surface is hot enough, and the time of contact sufficiently long, that practically all the hydrocarbons are decomposed to some extent. Therefore, the gas in a horizontal retort should be removed as fast as possible, as the temperature of the top of the retort cannot be kept below that of the remainder of the retort. But in the case of a coke-oven the temperature of the top may be kept low if the original design permits it.

I think your question is answered above—that is, immunity from naphthalene trouble would be due to a comparatively small amount being in the gas, which in turn may be due to a small production in the retort or oven, or to a large production which has afterwards been removed in the condensing plant.

J—I have not enough complete analyses of the gas in conjunction with naphthalene determinations to give any definite answer to your query; but it is my opinion that you will not find a great deal of difference in the characteristics of the gas where considerable variation of naphthalene content has been shown, if the same coal is being used.

The difference in the quantity of naphthalene observed will probably be due in most instances to a variation in the amount of the heavier hydrocarbons which are broken-up; and the difference, if it could be observed anywhere, would be in the character of the tars and oils condensed. I am quite confident that this is true, from a close study of the heat-value content in gas made at varying temperatures from coal of practically uniform characteristics.

To-day, as you know, it is worth, in refined form, upwards of $300 per ton. Of course, it will not maintain this value after the war, but will always be a valuable bye-product; and I am convinced that as the B.Th.U. valuation of gas becomes universal, we will not make any effort to prevent the formation of naphthalene, but quite the contrary will scrub all our gas with oil, and remove the naphthalene and benzol before it is distributed.

This gives an ideal gas for distribution—stable, but little affected by compression or temperature variation, free from the common trouble of the continual adjustment of burners to avoid blackening, and at the same time returns a valuable residual bye-product.

(*To be continued.*)

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Mr. Clark and Mr. Ionides.

Sir,—Your readers, I am sure, must have been astonished when they read the paper by Mr. Ionides which appeared in your last issue, to see a reference to an authoritative statement which appeared in the "Journal" on May 4, 1915 and which was associated with my name.

Mr. Ionides makes the statement appear as though I said that not more than 22 candles per c.ft. of gas can be obtained at ordinary pressure.

Those of your readers who have been able to look up the "Journal" for the date alluded to found that the source of Mr. Ionides' information was a diagram given in a paper that I read on April 30, 1915. They will also have found that the assertion based upon it was far from warranted.

I can hardly believe that Mr. Ionides made the statement with the full knowledge of what it meant. I prefer to think that want of knowledge of the elements of illuminating engineering was responsible. In any case, when he has had an opportunity of studying further the source of his information, and I hope of recognizing the nature of the assertion made in the paper which he read before the Institute of Metals, he will see that the only course left to him is to make an apology for having misled those who listened to or have read the paper.

J. G. Clark.

Sept. 27, 1917.

Contract Prices for Coal.

Sir,—We buy all our coal through factors. It was sold here at 14s. 2d. per ton under the 1913-14 contracts; hence in 1915 it was sold at 18s. 5d. per ton, in accordance with the terms of the Coal Price Limitation Act.

Thus, 1913-14 prices	14s. 2d.
Plus the 4s. advance	4 0
,, 50 p.ct. wagon hire	0 3
	18 5

But through some inexplicable reason the price of the coal was advanced by the factors to 19s. 11d. on 1916-17 contracts, and to 20s. 2d. on 1917-18 prices, with a "take it or leave it" attitude.

What price should this now be reduced to, to be strictly in accordance with the new Wholesale Coal Prices Order; and how is this figure arrived at?

The above extortionate prices on our two last contracts were agreed to prior to my appointment to these works. In your opinion could anything be re-claimed on these, if the facts were submitted to the Coal Controller?

"Dare Lucem."

Sept. 27, 1917.

Mr. Ionides' Paper—A Correction.

Sir,—At the top of the first column on p. 565 of your last issue, I notice a serious error. It is there stated (in brackets) that I demonstrated my apparatus, and that the temperature of the furnace was read off at 1600° C., and the flue gases at 650° Fahr.

The actual announcements made at the meeting were as per the enclosed.

I beg you will give this correction prominence in your next issue.

Aug. C. Ionides, Jun.

34, *Porchester Terrace, W., Sept.* 27, 1917.

Results of Experiments announced at the Meeting of the Inititute of Metals on Sept. 19, 1917.

1. Water heater.—Temperature of waste gases, 65° Fahr.
2. Consumption of gas with "Captive Fire" Light 1·85 c.ft. per hour.
3. Consumption of gas with atmospheric burner, 6·6 c.ft. per hour.
4. Comparative photometric values—"Captive Fire," two-and-a-half times that of the atmospheric burner.
5. Temperature of the furnace, 1060° C.

Low-Temperature Distillation of Inferior Coals.

In the "Journal" for the 18th ult., a letter appeared from Mr. F. D. Marshall, criticizing some points in the paper on the above subject that Mr. F. T. Winmill read before the Society of Chemical Industry. The letter has since appeared in the "Iron and Coal Trades Review," and it was followed by one from Mr. H. Eustace Mitton, M.Inst.C.E., of the Butterley Company's collieries, near Alfreton. Mr. Mitton considers that the paper sets forth very clearly the treatment of the fuels used, the type of retort, and the result obtained. But where he disagrees with Mr. Winmill is in his conclusions. Mr. Winmill stated: "It must be concluded, therefore, that low-temperature distillation cannot be made to pay on the value of bye-products alone, and hence is useless as a means of utilizing waste fuels of high ash content." Mr. Mitton writes: "I think this statement is very strong, especially at the present time when many eminent men are engaged on this very important matter." For some considerable time the Butterley Company have been conducting a very exhaustive search into the treatment of fuels with the low-temperature process. The services of Prof. L. T. O'Shea have been obtained; and up to the present I feel satisfied there is a prospect of the inferior coals being successfully treated as a commercial proposition, providing the coal is used to destruction. The main points, to my mind, are the production of a retort that can be used economically so as to abstract the oil-products, and the destruction of the residue in producers so as to recover the sulphates and general power from the gas. The subject is only in its infancy, and requires the support of the Government and large companies, with the brains of experts; and with this combination I do not consider that the outlook is as black as Mr. Winmill anticipates from a commercial point of view."

REGISTER OF PATENTS.

Preserving the Burner Pipes Used with Gas-Furnaces.—No. 108,939.

Chillington Tool Company, Ltd., and Nettleton, L., of Wolverhampton.

No. 14,193; Oct. 6, 1916.

This invention relates to furnaces to which combustible mixture, supplied under pressure through pipes, enters through passages formed in the refractory material of the furnace; the mixture being usually produced within the pipes by air under pressure issuing through a jet-nozzle and drawing in gas (or by gas under pressure drawing in air). The mixture thus produced issues from the pipes under pressure and passes through the passages into the furnaces.

The main object of the invention is to provide means whereby the liability of the nozzle ends of the pipes to be destroyed by the back-flow of the heat, or back-burning of gases within the pipes, will be obviated. This is effected by constructing the opening in the brick-work of a furnace with which the nozzle end of the burner pipe communicates with a middle straight portion of about the diameter of the interior of the pipe, and with the ends flared or trumpet-shaped; and to place the nozzle end of the pipe in such a position in relation to the opening as to leave a clear space around the end of the nozzle through which, in case of back-fire, flame will escape without substantially impinging against the end of the nozzle. The straight portion of the opening curves into the flared portions, constituting a bore on the Venturi principle, with the result that the combustible mixture does not ignite immediately on issuing from the nozzle, and the ignition does not take place until the mixture commences to expand immediately after passing through the restricted portion of the Venturi bore.

By this arrangement of opening and burner pipe, the nozzle of the burner pipe is insulated from the heat of the furnace, and is not therefore affected by the heat, however high the temperature of the furnace may be; but if by any chance—such as an external flame coming into contact with the mixture as it issues from the burner nozzle or a considerable drop taking place in the pressure of the mixture—the flame is caused to strike-back, it readily passes out around the burner nozzle without the nozzle getting heated to any extent that would either destroy it or impair its use. Any burning-back, however, of flame around the burner nozzle would be immediately detected, both on account of the visibility of the flame and of the roaring noise it would make; and then, by cutting off the gas supply momentarily, this back-flame becomes extinguished, and the gas may then be turned on again.

Apparatus for Washing Coke, Breeze, &c. No. 108,955.

Jennings, A. L., of Cleckheaton.

No. 15,324; Oct. 27, 1916.

This machine, for washing coke, breeze, or the like, comprises a tank having a flat or curved bottom; but when a flat bottom is employed, the lower portion of two of its walls are made to taper inwards. The upper part of the tank is divided into a number of compartments of different sizes; the division plates being of such a depth as to permit of their lower edges being below the level of the water in the tank. A vaned roller or reciprocating plate is arranged in front of one of the compartments for agitating and washing the coke or breeze, and transferring it from the central to the outlet compartment. The framework carries a driving-shaft having a pulley, with one or more sprocket wheels, and an eccentric fixed thereon. Means are provided for removing the washed coke or breeze from the tank, either by an elevator or an ejector plate jointed to one of the sides of the tank in front of or behind an opening in it. The plate is operated by the eccentric; while a bucket elevator carried over wheels and pulleys removes the dirt and other *débris* from the bottom of the tank.

Furnace for Treating Spent Iron Oxide. No. 108,986.

Kershaw, J., of Lordship Park, N.

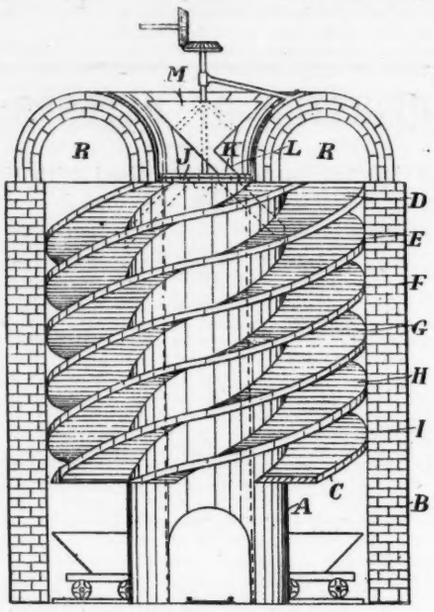
No. 17,280; Dec. 1, 1916.

This furnace for the treatment of spent iron oxide provides means whereby the passage of the oxide through the furnace is effected by gravity alone. It has a flue disposed at such an inclination that the untreated oxide remains in repose, but when treated will travel down the flue by gravity. There is a device for feeding the oxide into the flue at a predetermined rate, and discharging means are disposed at the end of each flue for controlling the exit of the residue after treatment. At the upper end is a collecting flue for receiving the gases evolved during treatment and conveying them to a recovery plant.

A vertical view of one form of furnace is given on p. 30; the outer wall and discharge flue being in section to show the arrangement of the inclined flues.

The furnace shown consists of a central shaft A and an outer concentric wall B, between which are supported six spiral floors C dis-

posed at a distance from one another in order to form flues D, E, F, G, H, I. Through the wall of the central shaft, shoots are arranged leading from a foundation plate J mounted on the upper part of the shaft. This plate has a number of orifices which correspond to the



Kershaw's Furnace for Treating Spent Oxide of Iron.

shoots. Above the plate is pivotally mounted another plate K, which is attached to the shoot L of the hopper M, all of which are mounted upon a shaft the lower part of which rests in a footstep bearing in the plate J. At the top is a bevelled gear wheel, to be rotated by another gear wheel from some source of power. Spanning the space between the upper part of the shaft A and the outer wall B a semi-circular flue R is disposed, having a tangential branch leading to the apparatus for treating the gases from the furnace.

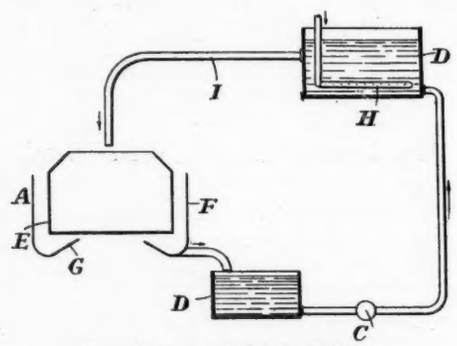
The spent oxide is fed into the hopper M, the shaft of which, in revolving, passes successively over orifices so as to feed a predetermined amount of it down the shoots one after the other in proportion to the rate of revolution of the hopper about its axis, and ensuring a constant feed of material for treatment into each spiral flue. The oxide before treatment has a certain angle of repose, but after treatment this angle is reduced to about half the former value. Consequently, as the treatment proceeds the material gradually falls down the inclined floor of each flue.

Producing Neutral Sulphate of Ammonia.
No. 108,990.

CAPRON, F., of Barcelona.

No. 17,648; Dec. 8, 1916.

According to this invention, impure crystallized ammonium sulphate is subjected to a washing treatment by a saturated neutral solution of ammonium sulphate until the solution leaving the crystallized sulphate shows no acidity. The solution leaves the neutral ammonium sulphate unaffected, as, being already saturated at the temperature of treatment, it can dissolve no more of the neutral sulphate, but washes out the acid impurities, so that, on centrifuging or filtering the crystals from the liquid, only the neutral sulphate remains.



Capron's Neutral Sulphate Producer.

A type of apparatus is shown which may be employed for carrying out the operation.

A is a centrifugal apparatus of the usual type, into the rotary basket E of which the impure crystals are fed. The liquid driven from the crystals is received by the outer casing F and collected in the annular channel G, whence it flows into the tank B. From this tank the liquid is raised by the pump C into the saturator D, which is provided with a perforated pipe H, through which ammoniacal vapours (pure ammonia, ammonium carbonate, or other suitable volatile salt) are caused to pass through the liquid and neutralize all the acid extracted from the crystals in the centrifugal machine. The liquid may have a slightly alkaline reaction when it leaves the saturator by the pipe I to flow again into the basket E, "as a little alkalinity is of no disadvantage, and directly neutralizes some of the acid in the crystals." The solution emerging from the outlet pipe from G is tested; and, "as soon as it is found to be neutral, the operation is complete and the supply of solution is stopped till the centrifugal machine receives a fresh quantity of impure sulphate."

Gas-Fires.—No. 108,997.

CHAMBERS, E. & C. E., of Belfast.

No. 18,456; Dec. 27, 1916.

This invention has for its object to provide gas-fires with water-heating means, or to provide means whereby gas-fires may be adapted to heat water for various uses, "while retaining their usefulness as a general heating medium together with the cheerful appearance and comfort of an open gas-fire."

The means employed for this purpose consist of a water heater or boiler (tubular or otherwise) made in one with the gas-fire so as to be permanently in position, or else separately so as to be easily fitted to existing gas-fires. The water-heater is connected to the water supply; and the heated water is led to a hot-water cistern with the usual fittings. In order to give a quick supply of hot water, the patentees propose to insert in the main hot-water system a small auxiliary tank or cistern, into which the heated water is caused to pass before reaching the main cistern, and from which a small quantity of hot water can be drawn off at the top of the cistern after the fire has been in action a comparatively short time. The inlet pipe would be near the bottom of the cistern, and the pipe connecting the auxiliary cistern with the main cistern would also be at the bottom of the auxiliary cistern.

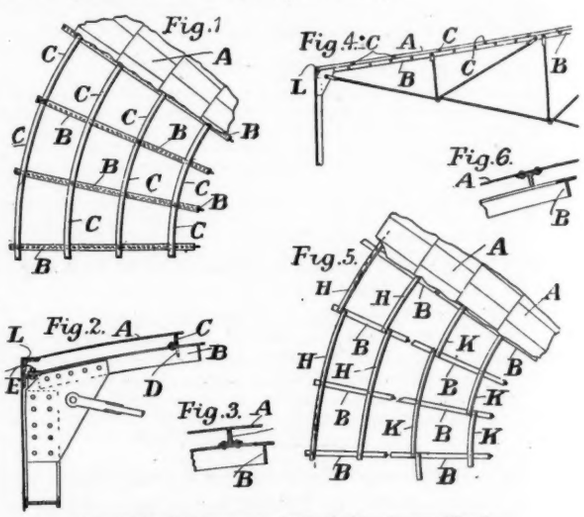
A gas-fire with water heater as described could be attached to the front of any ordinary kitchen range and connected to the existing hot-water system, and would give the necessary supply of hot water for usual purposes while "also giving a clean and handy heating fire for the kitchen, which could be readily regulated to suit varying requirements as regards heating of the room and the amount of hot water required."

Gasholder Crowns and Crown Framings.
No. 109,039.

R. & J. DEMPSTER, LTD., and BEARD, G. F. H., of Manchester.

No. 10,502; July 21, 1917.

The invention, relating to the crowns and crown framings of gasholders, has for object to provide bracket bars, which connect the rafters together across the bays formed thereby.



Beard's (R. & J. Dempster's) Gasholder Crown Sheets.

Fig. 1 is a plan of a portion of the crown of a holder (the sheeting being removed to a large extent); fig. 2 is a sectional elevation of part of the top lift or crown portion of the holder; and fig. 3 is a modified form of fig. 2. Fig. 4 is a sectional elevation of a portion of a trussed crown of the holder (similar to fig. 1), and is an extended view of fig. 2 on a smaller scale. Fig. 5 is a plan view of the crown of a holder, similar to fig. 1, but in which modified forms of bracket bars are indicated. Fig. 6 is a modification of fig. 3.

Between the crown sheets A (figs. 1 and 2) and the main rafters B, bracket bars C are mounted on the upper surfaces of the main rafters. The bars are bent circular when they are ready to be placed in position in the crown, without camber being provided in them in an upward direction. They are connected to the rafters, and each segment rests upon three rafters.

Alternatively, the sheeting may be attached to the bars in some other manner. For example, in fig. 6 a bar is shown only attached to the sheeting so that the latter makes a butt-joint over the bar. In fig. 2, however, the sheeting merely rests upon the bars E, and is

attached to the top curb L of the holder. The section of bracket bar employed may be varied—a **T** section being indicated in fig. 3. In fig. 2, a cleat D is attached to the bar C between a pair of rafters. In this arrangement, bolts E (usually employed for holding down the rafters) can be entirely covered in by the crown sheeting—thus protecting them from weather effects, "as well as preventing them acting as obstructions, and destroying the continuity of the riveting used to attach the crown sheets to the top curb."

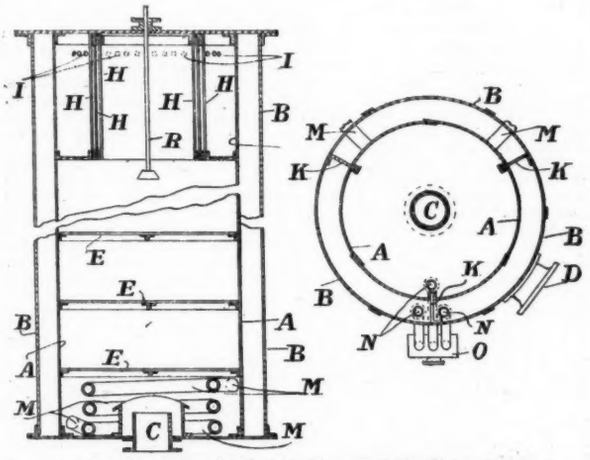
In fig. 5, bracket bars H are shown in position, so that one extremity of a bar is at a greater radial distance from the centre of the holder than the other extremity, as will be seen from the circumferential line shown broken and across the path of the bars, which approximately take up the positions of parts of spirals in plan. For this purpose they may be formed either circular in shape or be curved to a spiral, "so long as they do not depart sufficiently from the concentric form, when in position, as to require in practice a camber in addition, before being applied to the structure." In fig. 5, the bracket bars H are arranged in "step" form, as well as the bars K, the latter being of the concentric form previously named. Thus either the bars K or H may be so spaced apart, relatively to each other, as to have a gap between the extremities which are shown in the figure as touching or adjacent on the same bar. In this way the bars may lie alternately up the crown or framing, and provide a varied support to the crown sheets.

Extracting Tar and Tar Vapours from Illuminating Gas.—No. 109,152.

Scott, J. W., Beard, G. F. H., and R. & J. Dempster, Ltd., of Manchester.

No. 16,058; Nov. 9, 1916.

The object of this invention is to remove a large proportion of the condensable vapours from illuminating gas by a gradual cooling process from a high to a lower temperature, by which means "a reduced proportion only of the lighter hydrocarbons is left in contact with the gas during the ordinary cooling or condensation process."



Scott and Beard's (R. & J. Dempster) Tar Extractor.

A longitudinal and a transverse section of certain portions of apparatus arranged according to one form of the invention are given—more particularly suitable for operating upon coal gas.

The apparatus (somewhat in the form of a circular tower) is made up of an inner cylinder A and an outer one B. C is the inlet for gas, and D the outlet, which is preferably placed near the lower end of the outer cylinder. Scrubbing screens E are supported at intervals up the length of the inner cylinder. At the upper end portion of the cylinder A, vertical screens H are indicated, in cylindrical form, with holes through them, so arranged that the holes in one screen shall not be directly opposite holes in an adjacent one. By this means, a stripping action is produced upon the gas passing through the screens in a tortuous manner. Communication between the inner and outer cylinders is by means of holes I partly around the upper end of the inner cylinder. The total area of these holes in the plane of the cylinder surface is less than the cross sectional area of the inlet C, with the object of attaining equal density of the gas within the vessel A.

Vertical partitions are shown at K. They are assumed to extend down the length of the cylinder B, and between it and the outer surface of the cylinder A. The object of the partitions is to keep the hot gases which pass out of A in contact with the outer surface of it for a lengthened period, before the gases escape through the outlet. By this means, the gas is caused to pass down the outside of the cylinder A, from the holes I, to the aperture at the lower end of one of the partitions K, and then up again to the aperture at the upper part of the next partition, after which the gas passes down again to the outlet D at the lower end of the cylinder B. The gas is thus caused to form a hot jacket for the gas in the cylinder A.

In order to keep up the temperature of the gas in the vessel A, coils M may be employed, supplied with steam or hot fluid for the purpose.

Apertures N are shown at the bottom parts of the cylinders A and B, in communication with pipes leading to an ordinary seal pot O, for collecting the tar or condensable liquors. A pipe R enters the cylinder A (with a spray nozzle at its lower extremity). It is in communication with a supply of liquid tar of suitable temperature, "or fluid capable of absorbing certain parts of the gas—such as naphthalene and its homologues—and desired to be removed as much as possible, on account of the tendency of the latter to be deposited at a lower temperature later on, if not previously arrested." The liquid tar is, however (regarding its temperature), affected by that of the gas in the vessel A, but this gas is subjected to the tar treatment while its reduction of temperature is delayed as described.

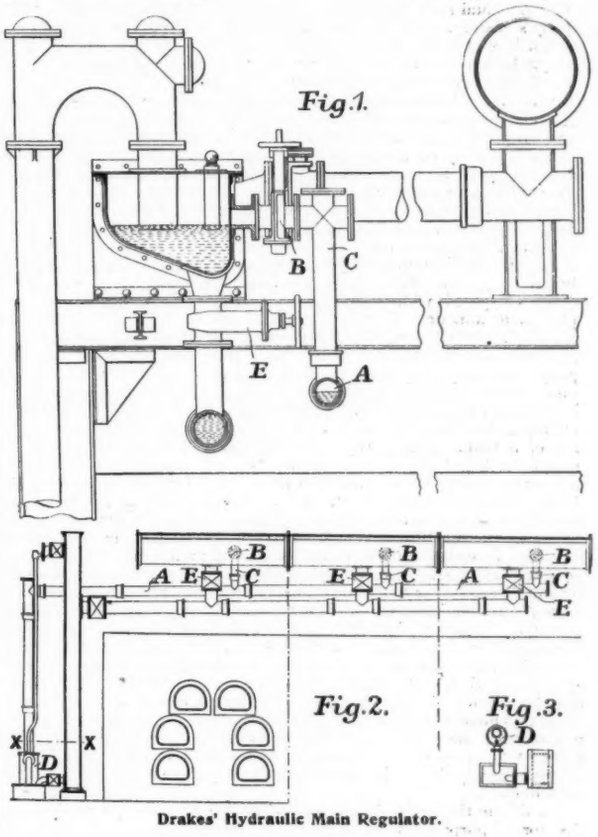
Hydraulic Mains.—No. 109,195.

Drakes, Ltd., and Drake, J. W., of Halifax.

No. 338; Jan. 8, 1917.

This invention relates to the pipe connections in conjunction with hydraulic mains used in the manufacture of gas, so as to remove any accumulation of tarry or heavy matter which is obstructing the main.

Fig. 1 is a sectional end elevation of a hydraulic main with certain of the pipe connections arranged in conjunction with it, together with the improvements applied to it. Fig. 2 is a front elevation of the hydraulic main showing the improved parts mounted in connection with it (but with the ordinary ascension pipes and connections omitted). Fig. 3 is a plan on the line X of fig. 2.



Drakes' Hydraulic Main Regulator.

The object of the invention is said to be obtained by employing the supplementary overflow pipe A arranged so that the liquor in the hydraulic may be drained away when relief in this direction is required. This overflow main is arranged so that the valves B are mounted in branch connections C leading from it to the several sections of the hydraulic in order that each section of it may be relieved by its respective valve being opened while the liquor that is drained away from the hydraulic is conducted to an ordinary seal-pot D common to the several sections of the main and the branches of the pipes leading from it.

Apparatus provided with the supplementary relief or overflow main, with its several branches and stop valves (as described) has, when in ordinary use, its valves closed, so that the hydraulic main will act in the usual manner to conduct the gas to the foul-main while the tar-main conducts the tar to the tar-tower. Should, however, any portion become obstructed (indicated by the blowing of the gas at the retort mouthpieces), the attendant would know how many of the stop valves E, mounted in the branches leading to the tar-main, to close, while at the same time he will also know that he will have to open the corresponding stop valves B in the branches C leading to the overflow main. He may then force the tar and liquor within the main (by pumping apparatus connected to the blank end of the main), so that the liquor is made to flow into the tar-tower, and that without the liquor being forced vertically through any of the branches into the hydraulic main on account of the valves E being closed—thus removing the obstruction.

During these actions of the pump connected to the end of the main (on account of the valves B in the main A being opened), the liquor within the several sections of the hydraulic will remain constant, or be drawn away so as to keep it at the desired level; while the drained-away liquor will flow through the main to the seal-pot D. Thus normal conditions of working of the hydraulic main are maintained in spite of, or during, any obstructions.

On the obstruction being removed by the action of the pump, all the valves E leading from the hydraulic main to the tar-main which had been closed are now open, while all the valves B in the liquor relief overflow main A which had been opened are again closed; so that the whole apparatus is prepared to perform its usual functions.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Meeting.

The Half-Yearly Meeting of the Company was held at the Offices, D'Olier Street, Dublin, last Thursday—Mr. JOHN MURPHY (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report [given in the "JOURNAL," Sept. 18, p. 521] and statement of accounts, said he hoped the latter would be considered satisfactory, when the abnormal times through which they were passing were taken into consideration. A very satisfactory feature in the half-year's working was the substantial increase in the quantity of gas sold to ordinary and prepayment consumers. If it had not been for the considerable curtailment in public lighting in the City and added areas, it was not improbable that the total sales would have reached the highest point in the Company's history. The increase referred to was even more gratifying when it was borne in mind that it had been effected in spite of the Daylight Saving Bill, the curtailment of the street lighting, the licensing restrictions, and the general economy imposed by the exigencies of war time. Expenditure on capital account was small, amounting to merely £1196; whereas the deductions, or credits, totalled £4446, showing that they had reduced their total expenditure on capital account during the half year by the sum of £3250. On revenue account, the profit for the half year showed a decrease over the corresponding period of £1401; but, as might be expected, practically every item of expenditure indicated a substantial increase. The cost of coal and oil during the half year had amounted to the very formidable figure of £93,417—a further advance over the corresponding period of no less than £15,154. Against this, they had realized a larger sum from coke and breeze by £8846, although the receipts for tar and liquor were down when compared with June, 1916. In connection with tar, he was pleased to announce that an agreement had been concluded with the Dublin Tar Company, Ltd., whereby their entire undertaking, as a separate and going concern, had been transferred to the Gas Company; and they fully expected that satisfactory results would be obtained when the plant had been renewed and the works generally put in thorough working order. Upwards of 100,000 gallons of ammoniacal liquor had been lost, as a result of an accident, through the bursting of a tank. This partly accounted for the reduced receipts; the remainder being due to the decreased income realized for sulphate of ammonia, owing to the maximum prices fixed for this fertilizer by the Food Production Department. There was an increase in the charge for repair of works amounting to £3283, and in the other items relating to manufacture of £629. These increases were entirely due to advances in wages and the enhanced cost of materials. The total expenditure on distribution, after deducting sales of gas-fittings, amounted during the half year to £20,390, which marked an increase of no less than £6000. During the past twelve months they had been obliged to renew and relay substantial lengths of main in various parts of the Company's area of supply; and the item of repair and renewal of mains showed an increase of over £5000 when compared with the corresponding period. The charge for rent, rates, and taxes showed an advance, principally occasioned by the increase in the rates. The cost of management was higher by £1100, occasioned by advances in wages to collectors, increased expenditure in advertising, and necessary repairs to the offices. Miscellaneous and special charges were up by £3000, entirely due to the increased bonus granted to the Company's employees.

Turning to the credit side of the revenue account, the net receipts for gas, for all purposes, were higher by practically £19,000, in comparison with the corresponding half year, and the rental from prepayment meters and stoves showed an increase of £2347. The compensation awarded by the Government in respect of loss by fire and damage to property during the disturbances in Dublin in April-May, 1916, amounting to £7605, had been placed to the credit of the special purposes fund, which now stood at the substantial figure of £17,483.

Two items in the balance-sheet—"bank overdraft" and "sundry creditors"—showed a large increase over the corresponding period, amounting in total to £55,338. This had been brought about by their considering it advisable to carry even larger stocks than formerly, and the increased cost incurred in purchasing them. If, however, they referred to the other side of the balance-sheet, it would be seen that the cash at bank and in hand, together with the stocks, &c., including their steamer, unexpired rates, and the additional investments, stood at a higher value by £55,217, which demonstrated his previous remarks. Since the last meeting, owing to the great difficulty experienced in chartering tonnage, they had acquired a suitable collier of their own, the s.s. "Ardri," 477 tons gross register, at the price of £18,500; and they were hopeful that they should be able to run her economically and at substantially less cost than the current freight. The buildings and plant at the works had been maintained in a good state of repair. During the half year a tar extractor had been installed at the City works, and was working very satisfactorily. With the exception of the cast-iron shell, the apparatus had been made and erected by their own men. The renewals to the retort-settings at the City works were being pushed forward with all speed, and the plant would be ready for operation during the coming winter. The laying of the high-pressure main from the City works to the Kingstown area was almost completed. It was very necessary for them to have in operation the whole of their available coal-gas carbonizing plant in Dublin and Kingstown—not only to meet the requirements of the Ministry of Munitions in regard to a greater output of tar, but also in order to curtail as far as possible the manufacture of carburetted water gas. The gas oil position was a serious one for works such as theirs; and although the Directors had anticipated events, and, in a measure, provided for contingencies as far as they could, it was essential that strict economy should be exercised in the consumption of gas oil. It had been their custom in the past to have all their meters repaired under contract. Prices for this work had greatly increased, and the Directors were advised that, as the work was of such magnitude, it was worth while for the Company to undertake it themselves, with their own men and in their own workshops. Accordingly, an existing building on Sir John Rogerson's Quay had been altered and converted into a meter-repairing shop, and the work of repairing their own meters was now in full operation. They felt confident that they might expect good results from this innovation, and that it would prove a profitable department to the Company.

In common with many other gas undertakings, the war had shown to them the disadvantages of being a sliding-scale Company. As the shareholders were aware, for every penny increase in the price of gas over the standard price, a reduction of ⅛ p.ct. must be made on the standard rate of dividend. The Directors had done all in their power to avoid an increase in the price of gas; but the abnormal advance in the cost of their raw materials, freightage, and wages had at length necessitated the price being increased by 6d. per 1000 c.ft. This, of course, entailed a compulsory reduction of ¾ p.ct. in the dividend. In conclusion, the Chairman referred to the new show-room, now completed, on the D'Olier Street premises.

The report was unanimously agreed to, and a maximum statutory dividend on the consolidated ordinary stock of the Company was declared—being reduced to the rate of £4 7s. 6d. p.ct. per annum, less income-tax, owing to the increase in the price of gas.

The proceedings concluded with a vote of thanks to the Directors and the staff for their services during the half year.

BRITISH GAS LIGHT COMPANY, LTD.

The Half-Yearly General Meeting of the Company was held last Wednesday at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. R. S. GARDINER in the chair.

The SECRETARY (Mr. A. W. Brookes) read the notice calling the meeting, the report of the Directors, and the Auditors' certificates attached to the general and the Norwich accounts. The report of the Directors was as follows:

The Directors submit the half-yearly accounts of the Company to June 30 last, as examined and certified by the Auditors, who have also vouched for the correctness of the investments held by the Company.

HULL.—The gas rental shows an increase of £7418 as compared with the corresponding period of 1916; the price of gas being 2s. 4d. per 1000 c.ft. for the six months, as against 2s. 1d. for the three months to March, 1916, and 2s. 4d. for the three months to June, 1916. The gas sold shows an increase of 24,013,392 c.ft.; being at the rate of 3·60 p.ct.

NORWICH.—The gas-rental shows an increase of £4906 as compared with the corresponding half year of 1916; the price of gas having been the same in each period—viz., 3s. per 1000 c.ft., subject to reductions for gas used for manufacturing and other purposes. The gas sold shows an increase of 34,572,500 c.ft., equal to 11·05 p.ct.

POTTERIES.—The gas-rental shows an increase of £269 as compared with the corresponding period of 1916; the price of gas being the same—viz., 3s. per 1000 c.ft., with a rebate of 3d. for prompt payment. Special discounts to large consumers and to consumers of gas for power purposes are also allowed. The gas sold shows an increase of 2,021,688 c.ft., being at the rate of 1·04 p.ct.

TROWBRIDGE.—The gas-rental shows an increase of £161 as compared with that of the corresponding period of 1916; the price of gas being the same—viz., 3s. 5d. per 1000 c.ft., with discounts according to consumption. The gas sold shows an increase of 561,147 c.ft., or at the rate of 1·63 p.ct.

HOLYWELL.—The gas-rental shows a decrease of £76; the prices of gas being from 4s. 8d. to 3s. 1d. per 1000 c.ft. for the three months to March, and from 5s. to 3s. 6d. per 1000 c.ft. for the three months to June, as compared with prices ranging from 4s. 8d. to 3s. 1d. per 1000 c.ft. for the six months ended June, 1916.

The total profit, after deducting income-tax and interest on debentures and debenture stock, is £30,763 12s. 6d., which, added to the balance brought forward, provides an available amount of £96,334 17s. 1d. From this sum the Directors have transferred £5000 to the general reserve fund (London). They now recommend a dividend at the rate of 10 p.ct. per annum, with a bonus of 2s. 6d. per share, both less income-tax, which will amount to £24,046 17s. 6d., leaving a balance to the credit of profit and loss account of £67,287 19s. 7d.

The Directors retiring by rotation are Mr. Frederick Wilkin and Mr. Harold G. Palmer, who offer themselves for re-election. The Auditors, Mr. E. Knowles Corrie and Mr. William Cash, F.C.A., also retire, and offer themselves for re-election.

A GRATIFYING EXPANSION OF BUSINESS.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, when he had set before the shareholders the leading features of the half year, he thought they would agree that the result of the Company's operations during this period was re-assuring in existing circumstances. The Directors had to report a gratifying expansion of the business, an experience which had been fairly general in the gas industry throughout the country. It was probably due partly to climatic conditions, and partly to the scarcity of coal which was at the present time being felt in many households. The total sales of gas amounted to 1273 million c.ft., which showed an increase of 5 p.ct. over the corresponding half of the previous year. It might interest the shareholders to compare these sales with the sales in the half year which immediately preceded the war. In the first half of 1914, the Company sold 1302 million c.ft. of gas, so that they were still 2¼ p.ct. below what the sales were before the war. For the first time for several half years there had been an increase in the sale of gas at Hull; but the chief gain was once more at Norwich. He had on some previous occasions mentioned that, owing to the very large increase which was steadily taking place half year after half year, the question of the best method of augmenting the producing power of the Norwich works was engaging the incessant attention of the Directors. He was sure the shareholders would realize that, while on the one hand the Board would like to proceed on plans based upon the probable future requirements of this station, and of a permanent nature, the present time was one of very great difficulty for dealing with any extensions in this

manner. However, they were fortunate in having at Norwich as their Engineer Mr. Thomas Glover, whose capacity and resourcefulness would be fully equal to the occasion; and both the shareholders and the consumers at Norwich might be absolutely sure that, whatever might be the demands for gas, they would be adequately met.

PROFITS AND THEIR DISPOSAL.

The profit for the half year under review amounted to £30,763; and the Directors recommended the distribution of the same dividend as in previous half years, and of the reduced bonus of 2s. 6d. that had been paid since the war. They also recommended that £5000 should be added to the general reserve fund; and this would leave a balance of £1716 to be added to the amount carried forward. Owing to the reluctance of the Board to increase the price of gas at the various stations, and to their having deferred doing so until the latest possible moment, the reserve funds which previously existed at the stations had been entirely wiped out. Notably at Hull they had, a few years ago, £50,000 in hand. It was therefore very necessary to add this £5000 to the parent Company's general reserve fund, bringing it up to £30,000, as this was the only fund they had to fall back upon in the case of any great catastrophe; and he need not emphasize that one or two of the Company's works were at the present moment exposed to very exceptional dangers. The sum of £25,000 was invested in Government securities; and if the accounts as presented were adopted, the Board would, as patriotic citizens, immediately place on deposit this further amount of £5000, ready for investment in the new loan, if (and when) the national requirements caused it to be brought out. ["Hear, hear."] As compared with a year ago, the capital account showed a decrease of £7926; and he thought he might take credit to the Directors that this was evidence of their watchfulness over the expenditure and the stocks of the Company in these anxious times. Most of the stations earned in the past half year more than their parliamentary interest; but, as he had explained, there was still an adverse balance at all the stations. It must be hoped that gradually this debit would be extinguished, and a credit balance established for the good and for the safety of the individual stations. The works had all been maintained in a proper state of efficiency, so far as the prevailing difficult conditions would allow.

WORKING RESULTS.

He had generally given the shareholders the quantity of gas lost through leakage, &c.; and they could well understand that at the present time, owing to the scarcity of labour and materials, it was not possible for their managers to devote to searching for broken mains and other causes of leakage the same constant attention that they generally did. He thought it was all the more gratifying that, in these conditions, the percentage of gas unaccounted for over the half year was only 3·71; and the figure for the year—which was a more reliable basis—was 6·19 p.ct. Considering that the Company's stations included the Potteries district, which was particularly liable to breakages, owing to subsidences caused by colliery workings present and in the past, an average of round about 6 p.ct. was quite satisfactory. During the half year, the Board of Trade had issued Orders substituting a standard of calorific value for the standard of illuminating power at Norwich and the Potteries; and last month they issued a similar Order in respect of Hull.

FAIR TREATMENT OF THE EMPLOYEES.

When he last had the pleasure of addressing the shareholders, he believed that he conveyed to them an impression of uneasiness and of disappointment that was very much in his mind at the time, owing to the pressing demands of the men's unions for advances in wages. The British Gas Light Company had, from time immemorial, treated their workmen with liberality and kindness. It had been the aim of successive Chairmen—including Mr. Horsley Palmer, who instituted the 25 years' silver medal and gifts—to show in rather unusual ways the Company's appreciation of long and faithful service. The Board had since the war very naturally taken into consideration the increased cost of living, and had made increases in the men's wages accordingly. It was rather disappointing to him that the applications which had been received should not have come from the men themselves (many of whom had been from father to son in the Company's employ), or even from the local union, but should reach the Directors from committees situated in towns far distant from their works, who could have no real acquaintance with the conditions of employment. Considering what the Company did for their men, he thought these extraneous advantages, in addition to wages, had not been sufficiently taken into account. They always granted pensions to their old workmen (which he believed they were one of the first companies to do), and frequently to their widows. However, during the half year under review applications from Norwich were referred to arbitration; and on an application being made at the Potteries, the Company at once, of their own accord, asked for arbitration. In both these cases advances in wages were ordered by the Arbitrator which the Board considered fair and reasonable, and which they at once most readily gave effect to. It might interest the shareholders to know that in the past year there was expended a sum of £3511 in voluntary allowances to the families of the men who had joined the forces. He mentioned this as an instance of the fair and proper treatment they gave to the men in their employ. There were 413 who had joined the forces; and he was sorry to say that 29 of them had lost their lives, including only a few weeks ago, at the age of 23 years, a very promising clerk at the London offices.

GAS FOR SHELL-MAKING.

He had been struck a few days since by a sketch in the Potteries showroom indicating how gas entered into the manufacture of nearly every constituent part of a shell. The sketch was in the meeting-room; and he hoped that the shareholders before they left would look at it, and see to what extent the gas industry was playing a part in the carrying-on of the war. When the need for high explosives was fully realized in 1915, the gas industry came at once to the fore; and ever since then the various directions in which gas contributed to the manufacture of explosives had had the greatest attention from every gas-works in the kingdom. Many other industries which were assisting the Ministry of Munitions had been authorized or enabled to pay their pre-war dividends or to maintain their pre-war standard of profits. He believed the gas industry was one of very few industries which from the very outset had conspicuously contributed to the supply of munitions necessary for the carrying-on of the war, without any hope of gain or of any pecuniary advantage whatever.

DUTY TO THE SHAREHOLDER AND THE CONSUMER.

He was sorry that they had once more to recommend the reduced bonus. The war had brought its burden to the gas industry; and their duty was to see that this burden was equitably apportioned between the consumer and the shareholder. As far as the consumers of their Company were concerned, he thought that the Directors had done their duty—and perhaps more than their duty. After the recent increases, the price of gas was now only 2s. 4d. per 1000 c.ft. at Hull and 3s. 4d. at Norwich. This showed that the Company had done their duty to the consumers. But they were at the same time, as Directors, not at all unmindful of the heavy loss of income that had been entailed on the shareholders—first by the payment of the dividend less income-tax (instead of free of tax, as was the case in years gone by), and then by the reduction of the bonus. This was a matter that was always in their minds; but, as he had said, they must try—and it was to the advantage of the Company, besides being their duty—to consider equitably the shareholder and the consumer.

GOVERNMENT WORK FOR OFFICIALS.

During the half year, they had been requested by the Coal Controller to lend him the services of Mr. Thomas Glover, the Manager at Norwich; and to the extent to which he could be spared from this station, he gave his time, and was doing very useful work under trying and difficult circumstances. They had also been asked to lend the services of their Manager at Holywell for some clerical service on a local Government Committee; and he need hardly say that in any direction in which the Company could assist the country in the present crisis, they would not be found wanting. He hoped that at a later stage some shareholder would propose a renewal of the contribution to war charities which the Board were authorized to make on the last occasion.

Mr. Frederick Wilkin seconded the motion, which was at once unanimously carried.

The Dividend and Bonus.

On the proposition of Major-General William T. Corrie, seconded by Mr. L. R. Abbey Williams, a dividend was declared at the rate of 10 p.ct. per annum, with a bonus of 2s. 6d. per share, both less income-tax.

Directors' Long Service.

The Chairman remarked that now he had a particularly pleasant and very exceptional duty to perform, and that was to propose the re-election as a Director of Mr. Frederick Wilkin. He had always looked upon Mr. Wilkin as being associated with this Company in an exceptional degree; but he never realized until last week, when he looked into the matter, that the circumstances were as he found them. Mr. Wilkin's father, Mr. John Wilkin, was recorded on some old minutes as having attended a meeting of the Directors in 1824 and as having been elected one of the original Directors at the first general meeting in 1825. He completed 50 years of service as a Director, resigning at the end of 51 years; and 42½ years ago Mr. Frederick Wilkin was elected as a Director in his stead. He (the speaker) believed it was absolutely unprecedented that father and son should occupy seats on a Board of Directors for the successive term of 93½ years; and he was sure that the shareholders would join with him, not only in re-electing Mr. Wilkin by acclamation, but in the hope which he and his colleagues most fervently entertained that Mr. Wilkin, like his father, might complete his 50 years of service. He need hardly say that, after his already lengthy association, Mr. Wilkin's experience and knowledge of the affairs of the Company were of infinite value; and he (the Chairman) only regretted that on the several occasions on which the chair had been vacant Mr. Wilkin had not seen his way to accept the offer which had each time been made to him of it. But he was good enough to unfailingly attend the Board meetings, and to give the Directors the benefit of the experience he had gained. This being so, they must all hope that the Company might long continue to enjoy the benefit of his services—and especially that the Directors might enjoy the pleasurable associations which they had had with him.

Major-General Corrie seconded the motion; remarking that to the eloquent speech of the Chairman it was not necessary for him to add a word.

This having been agreed to,

The Chairman said he had now to propose the re-election of Mr. Harold G. Palmer as a Director. If it were only for the inestimable services which his father, Mr. Horsley Palmer, rendered to the Company for so many years, he was sure that the proposal would commend itself to the meeting. But Mr. Palmer was a very useful member of the Board, inasmuch as he was a qualified civil engineer. Immediately on the outbreak of war, Mr. Palmer insisted on enlisting as a private. Later he received a Commission in the Engineers, and went over to France, with the result that he was now present with a gold bar on his arm. After many months of convalescence, he had received an important Government appointment in Scotland; and while the duties of the position would keep him in that country, he was arranging to attend the Board meetings from time to time.

Mr. Henry Woodall seconded the motion, which was carried.

Mr. Henry Pullman proposed, and Mr. Arthur G. Burney seconded, the re-election as an Auditor of Mr. E. Knowles Corrie. Mr. Charles Webb proposed, and Mr. Richard Stevens seconded, the re-appointment of Mr. William Cash as Auditor. Both these resolutions were carried.

Donations to Charities.

Mr. Pullman said that the Chairman, in the course of his eloquent speech, had referred to a sum being authorized by the shareholders to be expended in war charities. It was deemed expedient at the last

meeting that this should take the form of a vote; and he (the speaker) had the pleasure of moving that the Directors be empowered to expend a sum not exceeding 200 guineas in this way during the then current half year. To put the matter in order, he would propose the same resolution again at this meeting.

Mr. Webb seconded the suggestion, which was agreed to.

Votes of Thanks.

Mr. Pullman remarked that he would like to say that the small number of shareholders present pointed conclusively to the fact that there was general satisfaction with the splendid balance-sheet which had just been put before the meeting. He desired to thank the Chairman for his lucid explanation of the figures, and to congratulate him and his colleagues most heartily on their successful efforts on behalf of the shareholders. He begged to move that the thanks of the meeting be given to the Chairman and Directors for their able management of the business of the Company.

This was seconded by Mr. Burney.

Mr. Webb, supporting the proposition, said he was sure there was no body of gentlemen more deserving of a vote of thanks than those who were connected with the gas industry. The times they had been going through during the last two or three years had been most strenuous, both for the Directors and those working under them. The shareholders ought to be very pleased that the Board had kept to a steady dividend of £1, and 2s. 6d. bonus. He believed a large part of the shareholders was composed of ladies; and they all knew that the dearness of living and reduced incomes told very much on ladies who were dependent on their investments. It seemed to him very wise to pay a steady dividend. Even if the Directors could have squeezed another 2s. 6d. out, the shareholders would only have expected 5s. next year; and if the amount could be kept at £1 2s. 6d. for some time to come, everyone ought to be satisfied.

The Chairman said the Board were very much obliged to the shareholders for the kind appreciation of their services. He would not disguise the fact that it had been a trying half year; and they had had very difficult circumstances to deal with. But so long as the Directors continued to possess the full confidence of the shareholders, they would go on putting forth their best efforts to maintain the long-enduring reputation of the Company. He now wished to move a very hearty vote of thanks to the Secretary, officers, and staff. If the Directors had found it a strenuous half year, one might be quite sure that the officers—situated, as most of the towns were, at considerable distances from the head office—had experienced a trying time. Expenses had increased, novel circumstances had arisen for which there was no precedent, and there were the difficulties of procuring and maintaining a sufficient stock of coal—difficulties which had been augmented recently by certain new regulations of the Coal Controller making it still harder for gas companies to obtain the sorts of coals that their particular plant was adapted to carbonize—and so on. In all the many difficulties that had arisen—and he did not say it in a merely perfunctory, formal manner—their officers, from the Secretary and Engineers downwards, had proved equal to the occasion, and had rendered, and were rendering, the Company most loyal and able service; and he did warmly commend to the shareholders the vote of thanks to the Secretary, Mr. John Young, Mr. Thomas Glover, Mr. H. E. Copp, and the other Engineers and officers, both in London and at the stations, for their excellent work during the past half year.

Mr. Henry Woodall, in seconding the vote of thanks to the officers, said he should like to add, what he thought they ought to say, that they were satisfied with the workmen, and offered them their thanks for all they had done. He was quite convinced that the officials would speak of their men in the same way. Though there had been a certain amount of trouble with the unions, they had not really had trouble with the men in any sense whatever. The Company had a very loyal set of men who, he thought, appreciated the care with which they were looked after by the Directors and the Managers of the stations.

Mr. Brookes, acknowledging the vote (which was very cordially passed), said that all the officers and staffs were putting forth their best efforts for the fulfilment of their duties under somewhat difficult conditions; and they recognized with the fullest appreciation the kind consideration and encouragement which they always received at the hands of the Directors. The vote would be much welcomed by them all—more particularly as it was so warmly supported by the shareholders.

METROPOLITAN GAS COMPANY OF MELBOURNE.

The Half-Yearly Meeting of the Company was held at the offices in Melbourne on July 27—Sir John Grice (the Chairman) presiding.

The Chairman, in moving the adoption of the report and balance-sheet, referred to the fact that 361 employees of the Company had enlisted with the Australian Imperial Forces. Of this number, 255 were still on active service, 22 had died on service, and 21 had been returned to Australia and discharged as medically unfit. Eighteen of the returned employees had been re-employed; but the remaining three were physically incapable of resuming their former occupation. During the half year £4563 was expended in making up the difference between the civil and military pay of employees serving with the forces. As to the operations of the Company, the sales of gas during the half year had totalled 1,593,000,000 c.ft., as against 1,550,000,000 c.ft. for the corresponding period of 1916—an increase of 2·8 p.ct. The increase for the June half of last year was 5·7 p.ct. During the first three months of this year, the Daylight Saving Act was in operation; and it no doubt affected the output for lighting purposes. There were 152,139 meters in use on June 30—an increase of nearly 3 p.ct. over the number fixed at the corresponding date of last year. The total number of stoves sold during the last half year showed an increase of 5962; but the output of gas-fires had shown a decrease—1926 having been sold, compared with 2233 for the corresponding period of 1916. The repairs and maintenance of the works had increased in comparison with last year by over £11,000. It was a very serious matter doing new work and effecting repairs with the abnormal prices ruling for all metals. The time might even come when it would be impossible to obtain the requisite metals. As to the disposal of profits, the following transfers had been made from the profits of the half year: Transferred to the reserve fund account, £22,000; to meter renewal fund account, £5000; to gas stoves, &c., account, £3000. After effecting these transfers, £3036 remained, which had been added to the balance carried forward to the current half year, making a total amount of £60,509 on this account. While they had actually carbonized 5738 tons less coal than during the corresponding half of last year, the cost to the Company had increased by £14,179. This was due to the extra cost of 3s. per ton payable under the Order of the Special Coal Board at the conclusion of 1916, operating as from Jan. 1. In addition, coal handling charges, including labour and cartage, had increased. They had for some time experienced extreme difficulty in maintaining anything like satisfactory reserves of coal; but no effort would be wanting to increase the stock of coal sufficiently to allow of a safe margin. He regretted that the power required to raise additional capital and get a site necessary for new works had not yet been granted by Parliament. Efforts were being continued; but they had not met with success. To meet the ever-increasing demands for gas, the Company had for all practical purposes exhausted the capital-raising powers that were originally conferred upon them. According to the report of the proceedings in the State Parliament, it would appear that the Government had again introduced an Amending Gas Bill into the House. Should the Bill be unfavourable to the shareholders, it would be impossible, in such times as the present, to expect investors to put in fresh capital or to lend money on the security of the undertaking except at high rates of interest; and such costs would, of course, be reflected in a corresponding increase in the price of gas in the future.

The report was adopted, and a dividend of 6s. 6d. per share was declared.

GAS CONSUMPTION IN BIRMINGHAM.

An Urgent Appeal for Economy.

Through the columns of the local Press, Alderman Sir Hallewell Rogers, the Chairman of the Birmingham Corporation Gas Committee, has issued an urgent appeal for economy in gas consumption during the coming winter, whether for domestic or manufacturing purposes.

He remarks that the output for the present year is very considerably greater than that of last year, which was a record in the history of the Gas Department. In fact, new records have been set up each year for the past eight years; and during the present summer the weekly output of gas has been exactly double what it was in 1909. The enormous increase during the war is due to the amount of gas required in connection with the manufacture of munitions; and this load shows no sign of abatement, but, on the contrary, is increasing day by day. The Committee feel that they must strain the resources of the department to the utmost to cope with new orders for munitions work, even though some of these individually represent a gas consumption which would be sufficient to supply some of the smaller towns in the district. The uncertainty, however, in regard to the provision of the necessary labour for the increased output, coupled with the difficulties which are being met with at the present time in obtaining supplies of raw materials—especially gas oil—causes the Committee grave anxiety as to the maintenance of a full supply of gas at certain periods of the winter, and compels them to appeal for the strictest economy to all consumers.

No effort has, it is added, been spared to cope with the increasing output. Every possible addition has been, and is being, made to the plant at the works; and the help of the Controller of Coal Mines has been enlisted in procuring the additional coal required for gas-making. It is anticipated that a million tons will have to be carbonized this year. Owing to the very large number of orders received for gas fires and stoves, and the depletion (due to the war) of the fitting department staff, the Committee have been compelled to refuse further orders for some time to come, and they urge consumers not to rely entirely on the use of gas for heating and cooking purposes during the winter.

EDINBURGH AND LEITH GAS COMMISSIONERS.

Increase in the Price of Gas.

The Edinburgh and Leith Gas Commissioners, at their meeting on Monday of last week, considered the estimate of income and expenditure for the year ending May 15, 1918. The original recommendation of the Works Committee was to make an all-round increase in the price of gas, as from the next reading of the meters (October-November), of 3d. per 1000 c.ft.; but at a special meeting of the Committee held prior to the Commissioners' meeting, it was decided to amend the recommendation to 4d. per 1000 c.ft. to ordinary consumers and 4½d. to prepayment consumers—making the prices 3s. 8d. and 4s. 2d. respectively, as compared with the pre-war rates of 2s. 8d. and 3s. 3d. The amended recommendation was approved.

It is anticipated that considerable economy will be effected in the cost of coal; but heavy increases in expenditure in other directions—rates and taxes, for example, are put down at a figure nearly £13,000 higher than last year—and a falling-off in the expected revenue from residuals more than counterbalances the reduction in the cost of coal, and makes the addition to the price of gas necessary.

The Convener of the Works Committee (Councillor Lindsay), in moving the adoption of the recommendation, said that it was unfortunate that at the present time a further increase in the price of gas should be made; but it was unavoidable. He stated that the large additional amount required for rates and taxes was partly due to the fact that the Commissioners would have to pay rates, as from Whitsunday last, on the full assessment of the Granton Gas-Works, instead of upon one-half as had been the case during the past seventeen years. Taking also into account war bonuses, and the large advance in the

price of materials, he considered that they were fortunate in making ends meet on so small an increase in the price of gas as that proposed.

War Bonuses and Wages.

At the end of July, the Arbitrator appointed by the Chief Industrial Commissioner, in awarding a bonus of 5s. per week to the Commissioners' workmen, &c., remarked that he hoped this award would give sufficiently substantial relief to render further demands unnecessary as long as the country can escape any abnormal economic disturbance. In view of this, the letter from the National Union of Corporation Workers, which was submitted to the Commissioners, seems somewhat premature. The Secretary of the Edinburgh Branch of the Union stated that, at a meeting of the members of the branch, he was instructed to ask the Commissioners to consider the granting of a further 10s. advance in wages to male employees and 5s. to female employees. The bonuses granted since August, 1914, were inadequate to meet the demands up to the present; and the advances now applied for would bring the Commissioners more into line with other employers of labour. The meeting also desired that all war bonuses and advances previously granted be converted to war wages, and, further, that the advances now requested should become operative from the date of the petition.

The matter was remitted to the Works Committee for consideration and report.

Alleged Pollution of a Brewery Well.

The Engineer (Mr. Alexander Masterton) reported that Messrs. W. Younger & Co., Ltd., had intimated to him that their well at the Holyrood Brewery had become contaminated and that they were convinced that the source of the pollution was the old gas-works in New Street. Messrs. Younger's theory was that the water had become contaminated with gas oil; and their Chemist's analyses bore out this idea. They had employed a well-sinker (Mr. Henderson) to examine the well; and in his report he stated that he noticed a strong "gassy" smell, and that in the mine at the foot of the well there was a very pronounced "gassy" and "tarry" smell—in some places so dense that he could stay in for only a few minutes. He also discovered traces of tarry matter coming through a band of rock. Arrangements had been made, Mr. Masterton added, for the Commissioners' Mining Engineers to inspect the well and report on their examination.

GREENOCK GAS UNDERTAKING.

The results of the past year's working of the Greenock gas undertaking have been very satisfactory; a net surplus of approximately £5000 having been obtained. This is the eighth financial year of the managership of Mr. James Macleod (now of Messrs. Brotherton & Co., Ltd., of Glasgow). The progress of the undertaking during these eight years was as follows:

Year ended June,		1910,	Gas accounted for		300,000,000 c.ft.
,,	,,	1911	,,	,,	316,000,000 ,,
,,	,,	1912	,,	,,	360,000,000 ,,
,,	,,	1913	,,	,,	383,000,000 ,,
,,	,,	1914	,,	,,	404,000,000 ,,
,,	,,	1915	,,	,,	426,000,000 ,,
,,	,,	1916	,,	,,	450,000,000 ,,
,,	,,	1917	,,	,,	459,100,000 ,,

The number of gas appliances out in the year 1909-10 was 3680, and in the past financial year 14,394. The number of consumers has risen from 14,440 in 1909-10 to 16,800 in the past year. The amount of coal carbonized in 1909-10 was 32,749 tons; in 1916-17 it was 41,462 tons. The gas accounted for in 1916 was 9161 c.ft. per ton of coal carbonized; in 1917 it was 11,070 c.ft. The unaccounted-for gas prior to 1912 averaged 12 p.ct., and during the past five years 3 p.ct. The average net surplus has been £3897 per annum. The reserve and depreciation funds were either depleted or non-existent; but this year they have grown to £15,756. The works have been entirely re-equipped, and the distribution system renewed and remodelled. Some of the plant, &c., added is as follows: Vertical retorts and auxiliary plant, gasholder and tank, condensers, purifiers, scrubber, tar-extractor, naphthalene extractor, liquid ammonia plant, "Simplex" vaporizer, boiler and accessories, 8-in. steel main, compressors and governor, town main governors, "Rotary" station meter, show-room and dwelling houses, exhauster, boundary wall, paving yards, alteration to meter-house, exhauster-house, mechanic's shop, mess room, and lavatories.

The total debt on the undertaking is £134,090, which works out at £291 per million cubic feet of gas accounted for. This shows very strikingly the strong financial position of the concern. The introduction of the supply of cookers free on loan conduced largely to the success of the undertaking; and the later introduction of gas-irons on a like basis has been greatly appreciated by the public generally. The increase in the price of gas when coal went up so much two years ago was about the smallest in Scotland; and last year the price was reduced to slot consumers by 1d. per 1000 c.ft.—the present prices being 2s. 11d. per 1000 c.ft. to ordinary consumers and 3s. 3d. to slot consumers, with discount for gas used for power and manufacturing purposes up to 20 p.ct.

Gas Matters at Doncaster.—The Doncaster Gas Committee have decided to recommend an increase in the price of gas by 3d. per 1000 c.ft., bringing the charge to 3s. for lighting and 2s. 9d. for power purposes. This, if approved by the Corporation, will be the third increase since the outbreak of the war. The pre-war prices were 2s. 2d. and 1s. 11d. respectively—the increases having been 4d. and 3d. The Corporation have decided to extend the Arbitrator's award of 4s. a week bonus to the municipal employees who were recently on strike to employees of all departments, except that the running staff in the tramways and electricity departments are to be dealt with separately. The 4s. per week award applies to men and women over 18 years of age, except women whose work brings them under the Munitions Acts, who will be dealt with under these measures—their wages probably being 27s. a week. To the others under 18, the advance is 2s.

BURNLEY GAS-WORKERS' ONE-DAY STRIKE.

The difference of opinion between the Burnley Corporation Gas Committee and the department's employees over the war advance on wages culminated in a one-day strike, as a protest. The men had threatened a fortnight previously to cease work if their contention was not agreed to; but on that occasion [*ante*, p. 576] the Gas Committee got the men to postpone action for a week, so that they might obtain the view of the Arbitrator on the point at issue in his award. Representatives of both sides met the Arbitrator in London; but the result of the conference was not known in Burnley until the following day (last Saturday week).

The Committee of Production had awarded Corporation workers 9s. a week advance on pre-war rates. The gas workers, who work seven days in the week, contended that the award was for a week of six days, and therefore they ought to be paid for Sunday labour at time-and-a-half. Six-day workers get 1s. 6d. a day extra; and for Sunday work the gas workers asked for 2s. 3d.—half as much again. It now appears that the Arbitrator has stated that his award applies equally to seven as to six day workers, but that the Sunday workers must be paid time-and-a-half. This means another 8d. for the gas men, which they are dissatisfied with. They argue that it is unfair to pay them 1s. 3½d. a day extra, and other workers who do not do any Sunday labour at all 1s. 6d. a day.

On the Saturday night the men had a meeting, and were unanimous in their decision to abstain from work on the Sunday, as a protest against what they considered "the niggardly reading by the local Council of the recent award of the Committee of Production." At this meeting, the men were aware of the new reading of the award; but it did not make any difference to their attitude. Also, they were of opinion that the Corporation should have been represented at the conference with the Arbitrator by the Chairman of the Gas Committee (Alderman Emmott) and the Gas Engineer (Mr. J. P. Leather), who were fully conversant with the whole of the circumstances.

In accordance with their decision, the men stayed away from work from 6 a.m. on Sunday until 6 a.m. on Monday. They agreed that the compressor men should remain at their work; but about 120 employees were idle, including the lamplighters. In order to conserve the supply, the pressure was reduced; and with a saving through the street-lamps not being lighted, the department were able to put on the normal pressure by 9 o'clock on Monday. As, however, the gas-works have not a full day's storage capacity, there was only a poor supply at night. By Tuesday everything was normal. The position as regards the men is the same as when they came out on strike as a protest; and there is some talk of them coming out every Sunday until they get satisfaction.

Alderman Emmott, in an interview, said they were offering to pay the men according to the Arbitrator's award, and they could do nothing more—particularly as the men employed by other corporations had without demur accepted the same award. The men would not follow their leaders' advice; and it was an unofficial strike. There would not have been any inconvenience to the public, had the department been able to carry out their plans of providing larger storage capacity than they now had. They had got the land, and had made arrangements to proceed with the work; but war broke out, and stopped everything. When they had this extra storage, they would probably do away with the Sunday making of gas.

There was not a strike of the men on Sunday. The reason for this was not that they were satisfied, but that the men most concerned in the dispute were over-voted by other employees in the department who are members of the same Union, and who contended they had a right to a voice in the matter. There was a long meeting on Friday night; and ultimately by a small majority it was decided not to strike on Sunday, but to give the Corporation a fortnight's notice that they desired an advance of 1½d. per hour and double time for Sunday labour. The men contend that those who work the longest should have most pay. They got the extra 8d. which the Arbitrator awarded them for Sunday, but want 2s. 3d. Their fresh demand is over and above the 9s. given them by the Committee of Production.

A STRIKE AT ABERDARE.

Added to the troubles which are the common lot of gas managers at this juncture, Mr. A. E. Davey, the Manager to the Aberdare and Aberaman Gas Company, has been called upon to face the difficulties of a strike of a very unreasonable character. After having received on different occasions since the beginning of the war advances in wages and bonus totalling between 9s. and 10s. a week, an application was made last June for a further 6s. a week all round. To this, however, the Company replied that, having regard to an arbitration award issued only the previous month, they could not see their way to make any further change so soon. Thereupon the men placed the matter before the Chief Industrial Commissioner, who also decided that their application was premature.

Having thus far been unsuccessful in getting their way, the men, on Sept. 10, gave a week's notice—apparently with the idea that they might in this way force the hand of the Commissioner; and two days before the notices expired they were informed by the Commissioner that Mr. Courthope Munroe, K.C., had been appointed to hear their case. This being so, they were requested to withdraw their notices—their Union also advising them to continue at work pending the arbitration. But the men refused to submit to arbitration, and struck work at 2 p.m. on Monday, the 17th ult. On hearing of this development, the Commissioner wired to the men's Agent (Mr. Victor Morgan) that they must return to work pending the arbitration. In consequence of this, the Agent and Organizer of the Union (who had up to that point refused to deal with the men after the rejection of their previous advice to return to work) interviewed the men and induced them to return to their work on the Tuesday night. As the result of their arbitrary action, the town was without gas on the Tuesday and

Wednesday of that week; the supply being resumed on Thursday morning. The Company are certainly justified in feeling aggrieved that, after having promised them what they first sought for in the way of an arbitration two days at least before their notices expired, and the Company having placed no objection of any kind in the way of this, the men should have taken a step resulting in so much loss and inconvenience.

The arbitration took place in Aberdare on the 22nd ult.; and the result is now being awaited.

PRIVATE OWNERS' WAGONS (NO. 2) ORDER, 1917.

The following is the text of an Order, dated Sept. 6, by the Board of Trade, for the purpose of making the most efficient use of railway plant:

1.—Where it appears to them necessary to increase the supply of wagons to any colliery, the Board of Trade may take possession of any private owners' wagons and use them for the purpose of maintaining an adequate supply of wagons at the colliery in question.

2.—Where possession is so taken of a wagon, there shall be paid to the owner for the use of the wagon such amount as may be agreed, or as may be determined, in default of agreement, by the Railway and Canal Commission or by an Arbitrator appointed by that Commission.

3.—The Controller of Coal Mines may issue instructions in writing from time to time directing the private owner of a wagon or wagons to place the same at his disposal, and the said Controller may take possession thereof on behalf of the Board of Trade.

4.—The owner of any wagon and any other person affected by directions given under this Order shall comply with any directions so given, and give all reasonable facilities for carrying out those directions.

5.—Any person acting in contravention of, or failing to comply with, any of the provisions of this Order is guilty of a summary offence against the Defence of the Realm Regulations.

6.—This Order shall apply to Great Britain, and may be cited as the Private Owners' Wagons (No. 2) Order, 1917.

Chelmsford Gas-Works Transfer.—A letter has been received by the Chelmsford Corporation Gas Committee from Messrs. Torr, Durnford, & Co., the Solicitors and Parliamentary Agents of the Chelmsford Gas Company, stating that they will advise their clients to agree to the payment of the sum of £1078 in settlement of the costs incurred by the Company for counsel, solicitors, and experts in connection with the transfer of the gas undertaking (the total amount of which costs as originally rendered was £1138), if the Corporation on their part will agree not to tax such costs. The Committee duly considered this offer; and, having regard to the substantial reduction offered by Messrs. Torr, Durnford, & Co., and to the uncertainty by what amount such costs might be reduced on taxation, and the expense which would be thereby incurred, recommends that the offer be accepted.

FILLING-STATIONS FOR GAS-DRIVEN VEHICLES.

Further Schemes.

We are informed by Mr. Harold E. Riley (the Hon. Secretary) that at a meeting of the Cornish Association of Gas Managers on the 18th ult., the whole question of the supply of gas for motors was considered. At Penzance, a regular daily service of motor char-a-bancs runs to St. Just; and these cars are now fitted up to run with coal gas. The experiment has been most successful; and the Gas Company have arranged for a permanent filling-station at their works. Other motors are now being fitted up; and a consumption of 2 million c.ft. per annum is already secured. In other towns inquiries are being made as to facilities for filling. It was unanimously resolved to provide filling-stations throughout the county; and that a uniform charge of 6d. per 100 c.ft. be made to non-residents—each company to make its own charge to residents. It was decided to fix 2-in. connections for filling, preferably straight from the holder; and as the capacity of the gas-containers will be known, no meters will be fixed. The following towns are now making preparations on these lines: Bodmin, Camborne, Falmouth, Fowey, Hayle, Helston, Launceston, Liskeard, Newquay, Penzance, Padstow, Redruth, Saltash, St. Austell, St. Blazey, Truro. Mr. Riley adds: "The other gas companies will no doubt all make provision on similar lines. I believe a scheme is on foot for the neighbouring county of Devon; and if gas companies throughout the country adopt similar schemes, a great incentive to motorists to use gas should result."

The local Borough Council have received a letter from the South Metropolitan Gas Company, asking for permission to fix a box in the pavement by the side of one of the special lamp-columns in front of the Company's show-room, in High Street, Lewisham. In the box they propose to instal a connection for the purpose of refilling the gas-containers on motor-cars. The box will be fitted flush with the pavement footway. It has been decided that, subject to the Company undertaking to remove the box upon seven days' notice in writing by the Council so to do, the application be granted, provided the box be fixed to the satisfaction of the Borough Surveyor.

The question of the use of coal gas for driving motor vehicles was discussed last week at a meeting of the Birmingham Gas Committee, held under the presidency of Alderman Sir Hallewell Rogers. It was reported that applications had been received from a number of garages for a regular supply of gas, in order that it might be retailed to the users of vehicles. The Committee, however, have not a sufficient amount of labour, nor the necessary motors, to enable them to give the garages the facilities they desired; and they are not prepared, in the difficult circumstances of the times, to sanction the re-sale of gas. The Committee prefer to keep the supply in their own hands; and, instead of being anxious to extend the consumption in the direction indicated more than is absolutely necessary, they wish to restrict it as far as possible to commercial and munition vehicles. They will shortly

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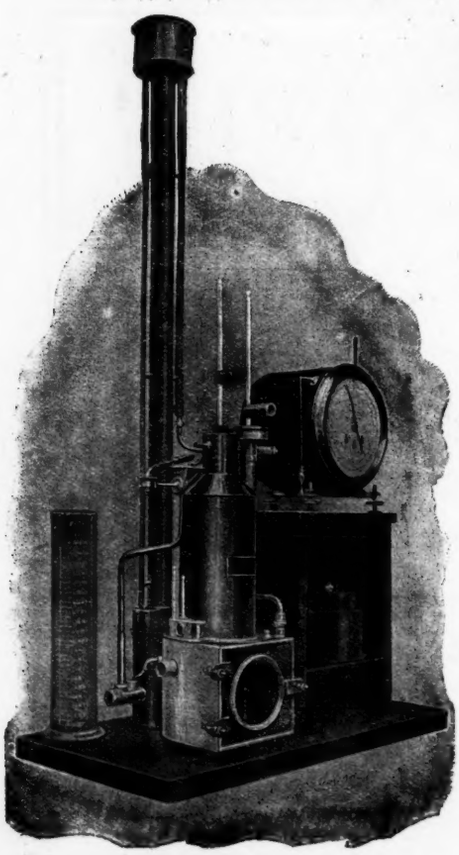

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LIMITED,

WESTMINSTER.

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issue a list of two or three stations in the centre of the city where gas-containers may be filled.

Mr. A. Fraser Sinclair, in his motoring notes in the "Glasgow Herald," says: The only topic worthy of discussion in carrying circles throughout the County Palatine at the present time is the use of coal gas as motor fuel. Manchester is the centre of the very keen interest taken in the matter; and the resources of the Corporation Gas Department are being thrown wholeheartedly into a scheme for linking-up all the gas-producing concerns in the county into a union for the supply of gas at a common price, with meters for filling the holders on the "penny-in-the-slot" principle, as well as the fixing of standard connections on the gas-works fittings and on the holder supply-pipes. Instead of payment by cash, the automatic machines will be operated by special tokens only, each token being value for 100 c.ft. of gas; and as there are gas-works at distances of 5 miles or less anywhere within a radius of 60 miles of Manchester, it is not expected that any trouble will be experienced in securing supplies. Indeed, the gas companies are all on the alert to help so far as they are able. Electricity has been rather a bane to a good many of them in recent years; and they will no doubt be glad of an outlet which is likely to be at once easily handled and remunerative. No mention is made of the use of compressors, such as are employed by the Glasgow officials; but they will almost certainly come into use in time. Already there is talk of fabric holders to be filled under compression; and it is even alleged that Messrs. Wood-Milne, the well-known rubber manufacturers, are preparing a holder, not of metal, which will be capable of withstanding pressures up to 1000 lbs. per sq. in.

A correspondent, in the Bradford Press, commenting on the development of gas-driven motor traction in the city, asks whether anyone among those who are experimenting so successfully during the summer has thought of the conditions in winter, and of the effects of naphthalene, under the influence of the cold, crystallizing round the inlet-pipe of a motor engine.

Acetylene as a Paraffin Substitute in Sweden.—The scarcity of petroleum in Sweden has, says the "Ironmonger," caused a run on carbide of calcium; and the carbide industry has been placed under Government control. A Carbide Bureau has been formed, which will ration the principal buyers, but will allow the material to be sold by retail with the smallest possible restrictions. It is said that the Swedish factories will be able to produce enough carbide to serve as a substitute for paraffin until next May. Unfortunately the use of carbide as a domestic illuminant is hampered by the difficulty of obtaining a good lamp. Such a lamp is made in America, but cannot at present be imported into Sweden. It requires rubber for its construction; and in Sweden rubber is scarce. But the Carbide Bureau has produced a lamp which it is claimed is nearly equal to the American pattern. Successful experiments are also said to have been made in the use of acetylene as a substitute for benzene for motor boats.

GAS RATIONING IN HOLLAND.

The Coal Distribution Board have decided upon a rationing of the gas supply in Holland; and they have issued general rules with this object in view, as a guide to municipal authorities. These regulations vary for different towns; but they all have the effect of curtailing severely the supply to consumers. A distinction is made between gas for cooking and that for water heating; and where during summer no allowance was made for water heating, the consumer now gets a few cubic feet for this purpose.

As a specimen of one of the rationing systems that is most favourable to consumers, some details are given below of what has been adopted at The Hague.

Gas for Lighting.

	Cubic Metres Yearly.
Single persons having separate gas-meter	120
Family of two to four persons	200
Families of larger numbers	240
For servants an addition is given of	100
Addition for every sub-tenant using separate room	80

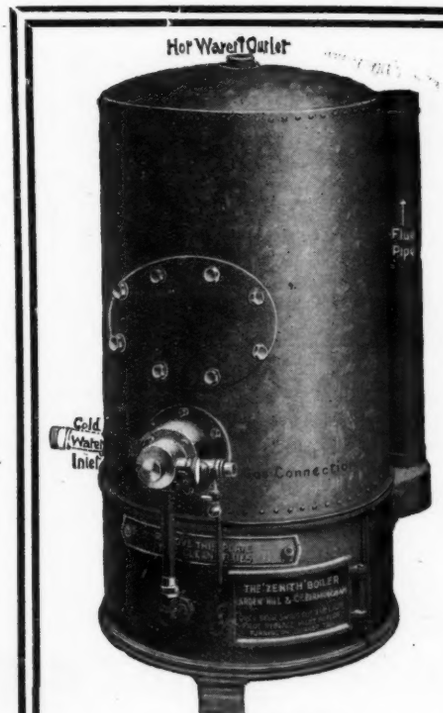
Gas for Cooking and Water Heating.

Single persons having separate gas-meter	150 + 37
Families of two to four members	240 + 60
Families of five to seven members	300 + 75
Families of larger numbers	360 + 90
Additional supply for servants	100 + 25
Additional supply for sub-tenants	80 + 20

Gas for Room Heating.

	Cubic Metres Monthly.
The supply allowed is	30 to 40

The Works and Highways Committee of the Lewisham Borough Council report that the Road Board have written intimating that it may be necessary in the near future to take measures for reducing the quantities of petrol for commercial and public utility vehicles; and they draw attention to the experiments which have been made for the utilization of coal gas for the provision of motive power. Inquiries have therefore been made as to the best means of employing coal gas. The cost of petrol for the past year was about £60; and the Committee are of opinion that it is very desirable gas should be used as the motive power for the Council's car. The initial outlay will probably be recouped during the first year. The Committee have decided (subject to the usual sanction) to accept the offer of Messrs. Ernest Lyon, Ltd., to supply and fit the Lyon-Spencer Gas Installation [see "JOURNAL" for the 18th ult., p. 516], with the necessary fittings and tray, to their car, at an estimated cost of £43 3s. 6d.



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Made in Three Sizes, 10, 20, and 40 Gals.

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BOILER

A COMBINED GAS-HEATER and STORAGE TANK, with Automatic Gas-Valve (Thermostat) complete. Gives a Constant Supply of Hot Water at any time, day and night as required. Can be fixed in any place where a gas connection is available. Moderate in cost and economical in gas consumption. Very suitable for supplying Hot Water for Baths and Lavatory Basins, for Domestic Use, for Hospitals and other Institutions.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 1.

The general condition of the London tar products market is unaltered. Makers do not offer pitch below 45s. net per ton f.o.b. works for export; while solvent naphtha is still scarce at about 2s. 6d. to 2s. 8d., net and naked, at producer's works. Anthracene testing 40-50 p.ct. is worth 6d. net per unit per cwt., packages free. Benzene, toluene, and carbolic acid still remain at the official prices; while creosote is nominally worth 4¼d. net per gallon in bulk at works.

Plenty of orders for sulphate of ammonia for home agricultural use are obtainable on the basis of the Government terms.

Tar Products in the Provinces.

Oct. 1.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. 6d. to 27s. 6d. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¾d. to 7¼d. Solvent naphtha, naked, North, 2s. 2d. to 2s. 3d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in this district, based on the value of the products for the month of August, was 28s. 1d. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

Manufacturers are somewhat concerned as to the effect of the Coal Distribution Order on bye-products, as it has been stated that the profitable bye-products were likely to be seriously affected by the forced purchase of coal from areas in which the quality was not so rich as the supplies hitherto used. Much interest has been shown in the formation of a Benzol Producers' Committee—representative of gas undertakings, coke-oven interests, and tar distillers—to watch developments and to conserve the interests of these industries. This Committee has come into being as the result of recent persistent rumours to the effect that the distribution of benzol after the war is to fall into the hands of the Anglo-Persian Oil Company, which is controlled by the British Government, and of the British Petroleum Company; and that by these means it will be controlled by parties interested in petrol, with which it may be looked upon as a competitor. The present price of benzol is 1s. per gallon, which is practically the same as before the war; whereas it costs nearly double the figure to produce. Toluol, on the other hand, is over 100 p.ct. dearer than in pre-war days. Naphthalenes are steady, at the increased figures of a week ago; while the heavy demand for solvent naphtha is maintained with supplies (if anything) on the short side. The position of pitch is unchanged at 48s. per ton f.o.b. London, for shipment to the Continent. The Provinces report rather a better tendency, although it has not been possible to get into the export trade to any degree worth mentioning. Stocks are increasing. There are, however, plenty of inquiries for the product—at a price; but holders are encouraged to maintain a firm attitude, on account of the strength of the London shipping position. Other products remain without change; the range of quotations being as follows:

Aniline Oil (pure): 1s. 3d. per lb.

Benzol: 90% London, 1s. 0¼d., North 10¾d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40%, 1s. 3d. per lb.

Crude Tar: London 30s., Midlands 23s. 6d. to 25s. 6d.; North 25s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 19s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190% 1s. 8d. to 1s. 9d.; North 1s. 3d. to 1s. 4d. per gallon; 90-160% naked London 2s. 6d. to 2s. 8d.; North 2s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £30 to £32 10s.; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil, 4¼d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 2s. 5d.; 97-99%, 2s. 6d. to 2s. 7d.; Glasgow 2s. 3d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

There is very little fresh news regarding sulphate. Export business has again been curtailed. There is plenty of demand from foreign countries; but licences are being refused, except in very exceptional circumstances. A small parcel has lately been allowed to go to Japan on "political grounds;" and certain British Colonies have been per-

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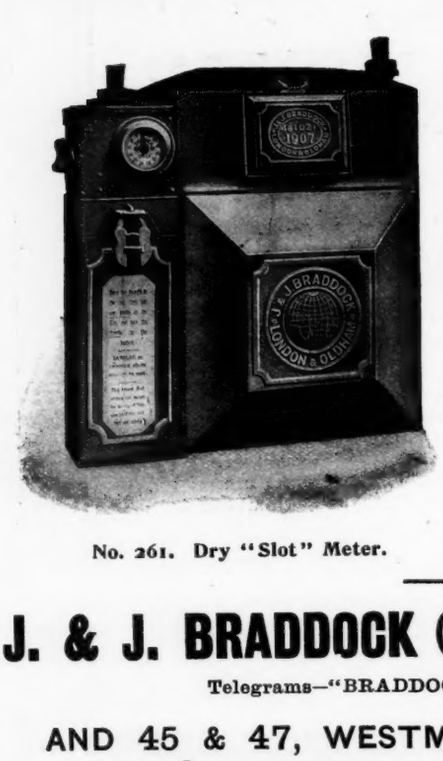

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THE BEST SLOTS MADE.

No. 265. Wet "Slot" Meter.

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Telegrams—"METRIQUE, LAMB LONDON." Telephone No. 2412 HOP.

mitted to draw small supplies here. For the export business done, quotations remain firm at about £24 per ton. The increased price to the home trade comes into operation this month; and already it is possible to say that it has made practically no difference to the demand on agricultural account. There will be no further advance in price until January; and consequently makers are no longer holding back deliveries. This refers specially to South Wales manufacturers, who have been most prominent in their efforts to get the export restrictions removed—efforts which are not likely to meet with any success for a long time to come, as the intention of the authorities is to still further curtail export licences. The demand for coke is improving. All reports speak of the satisfactory working of coke and bye-product ovens; and the production of sulphate, although much greater than last year, will be readily absorbed in home agricultural and other purposes. At the same time, there is no evidence that any shortage of supplies will occur.

Quotations (basis 25 p.ct., double bags): Home trade: October-December, £15 15s.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

COAL TRADE REPORT.

Northern Coal Trade.

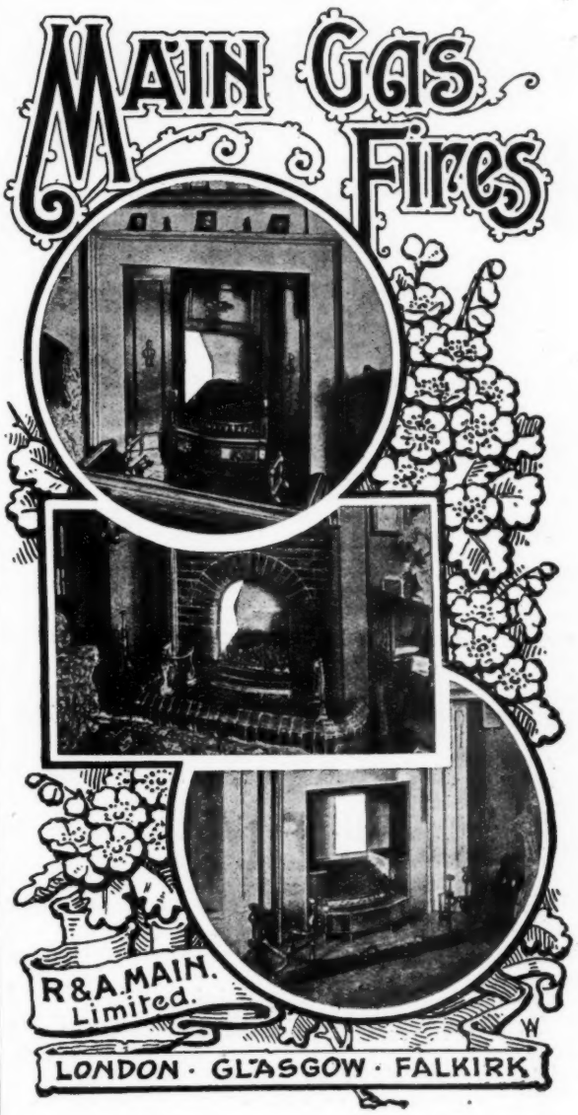
There is a steadier trade in some of the branches of the local industry; but the lack of ready steamers makes the export branch very unequal. In steam coals, the demand is fuller, especially for best kinds. Best Northumbrian steams are firm at 30s. per ton f.o.b.; second-class varieties are from 25s. 6d. to 27s.; and steam smalls are in ample supply at from 18s. 6d. to 20s. In the gas coal trade, the consumption is now steadily increasing; but where much of the production is sent by sea, there is an inadequate supply of steamers, though from 19s. 6d. to 20s. has been offered, Tyne to London, for gas coal freight. Still, for best Durham gas coals there is a good inquiry; and the current quotation is from 25s. Second-class descriptions are quiet at 23s. 6d.; while for "Wear Specials" there is a good inquiry at from 27s. to 30s. Apart from the limited export, the Durham coal trade is firm; and this stiffens the gas coal branch, which is naturally in greater activity with the entrance into October. There is a slow settlement of the new conditions of contracts; and some contracts for limits outside the northern rail-supply area have been transferred. In the coke trade, the production is increasing, and in the case of one or two inland gas-works stocks are a little heavier. Good gas coke is from 30s. to 31s. 6d. per ton f.o.b., according to the place of shipment. Coke freights are still based on near 45s., Tyne to Havre or Dunkirk.

New Joint-Stock Companies.—One effect of the war is shown by the annual report of the Board of Trade as to the joint-stock companies registered in England and Wales during 1916. There were only 3081 new companies, with a total capital of £46,475,768, against 5701 registrations in 1914, with a capital of £104,306,797. During the year 1350 companies went into liquidation, and 2756 were removed from the register as they were no longer carrying on business. The total number of companies on the register at the end of the year was 66,131; but that would be reduced to about 55,000 if account is taken of those in course of liquidation or threatened with removal from the register.

Fife Coal for Gas Making.—A conference of gas companies and corporations in the north-eastern area of Scotland, from Inverness to Peterhead, was held at Buckie for the purpose of protesting against the Coal Controller's Order whereby coal required by gas-works must be drawn exclusively from Fife. Representatives were present from all the towns. Mr. Petrie (of Inverness) was Chairman, and Mr. W. Ritchie (of Peterhead), Secretary. During the discussion, figures were submitted showing that, if Fife coal was to be used exclusively, it would mean an increase of coal, to produce the same amount of gas as at present, of from 4000 to 5000 tons a year in that one district alone. The object with which the Controller set out, to reduce railway haulage, was thus defeated. It would also mean an expenditure of £16 extra upon every 100 tons of coal at present used. Various representatives gave their experience of Fife coals; and a resolution was unanimously adopted calling upon the Controller to reconsider his order to the extent of issuing licences providing for 50 p.ct. of the supplies being drawn from the Lothian districts.

Lighting and Fuel Difficulties in Denmark.—According to a Reuter telegram from Copenhagen, dated Sept. 27, a probable return to primitive methods of lighting and heating was hinted at. M. Rode, the Minister of the Interior, speaking at a public meeting, emphasized the fact that, in neutral countries, as well as in the belligerent countries, economic life was entirely dependent upon supplies of fuel. The efforts to increase the home production of fuel had resulted in what promised to be a certain supply for the rural communities and smaller provincial towns being obtained; but as regards industry, gas-works, electricity works, and the requirements of the great towns, the home consumption was dependent on a supply of coal from abroad. The future was quite uncertain; and the prohibition of the import of fuel to Denmark would be a great misfortune. In regard to the question of lighting, also, the outlook was altogether uncertain. It was not yet known whether supplies of petroleum could be expected. They had, therefore, endeavoured to provide lighting during the winter by means of train-oil spirit and calcium carbide. It was hoped that it might be possible, though it was still uncertain, to import carbide from carbide producing countries. Tallow candles, train-oil lamps, and other means of lighting used in the far-distant times of the past would, perhaps, become Denmark's only method of lighting in the near future. Great privations were unavoidable, and it was only by the utmost co-operation and mutual support that Denmark would be able to fight through the fourth year of the war.

MAIN'S NEW FOLDER IS READY.



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WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Economy in Coal Consumption.

A memorandum has been issued by the Coal Controller containing various suggestions whereby an economy may be effected in the use of coal. With regard to power users, it is suggested that factory owners who at present generate their own power by means of coal should make arrangements for taking their power requirements from an outside source, either public or private, in districts where the power supplies have a margin available, and thereby reduce the total amount of coal used. The Controller will assist as far as possible in obtaining priority for plant, machinery, and motors required, provided a substantial coal-saving can be demonstrated. The use of locally produced coke or coke breeze is recommended in place of coal as much as possible in domestic grates, factory furnaces, public utility plants at light loads, also in baths and wash-houses, provided coke is available in sufficient quantities. Regarding public services, the Controller suggests the curtailment of those services which entail coal consumption, such as early and late tramways running, after consultation with the Ministry of Munitions and the Ministry of Labour, where munition and other workers are likely to be affected. The installation of gas or electric cooking and gas-heating appliances is recommended in public and private buildings, with a view of saving coal generally, and lessening the serious inconvenience to the public during the winter, should the local distribution of coal become either irregular or insufficient. On the question of emergency disconnection, the Controller suggests the application to the Board of Trade by electric supply authorities for sanction to disconnect classes of non-essential consumers in cases of urgent necessity, in order to enable the supply to be continued to munition and other essential users. This power, it is recommended, should be obtained, though it need not be put into execution until the necessity arises. The memorandum also suggests that arrangements should be made with neighbouring towns to interconnect electric distribution systems or generating plants by means of underground cables, or, in suitable cases, of temporary overhead wires over the intervening country, so as to enable one or two of the most economical power stations in each district to supply several towns at light loads, instead of each town having to run its own power station uneconomically at such times.

A Satisfactory Position at Tipton.—It was reported at a meeting of the Tipton Urban District Council last week that the gas-works are "going on satisfactorily." The Council are fortunate enough to have a fair amount of coal in stock; and they also have contracts which they anticipate will tide them over the winter months. They are under an obligation to furnish with gas a portion of Rowley Regis, and have further been requested to increase the supply required by Dudley. With this request they are in a position to comply; but gas will only be sent to Dudley so long as the total demand does not exceed the capacity of the Tipton works. It is not intended further to increase the price of gas for the present financial year.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 26.]

Nos. 13,264—13,685.

Appleby, E. G.—"Feeding fuel to gas-generators, &c." No. 13,553.
Appleby, E. G.—"Automatic removal of ashes from gas-generators, &c." 13,554.
Bentley, G. H.—See Appleby. Nos. 13,553, 13,554.
Broughton, H. & W.—"Storing and supplying gas for motor vehicles." No. 13,518.
Clarke, J. V. & W. A.—"Separating thorium from other rare earths and manufacturing thorium nitrate." No. 13,617.
Devey, J.—"Regulating the supply of gas to internal-combustion engines." No. 13,444.
Easton, R. W.—"Retorts, coke-ovens, &c." No. 13,312.
Fletcher, Russell, & Co. & Fletcher, T. W.—"Gas-burners for furnaces." No. 13,583.
Gorman, F. G.—"Carriage of gas fuel on vehicles driven by internal-combustion engines." No. 13,412.
Hill, H.—"Non-rigid gasholders for motor vehicles." Nos. 13,283, 13,284.
Jolly, J. C.—"Collapsible gasholders for motor vehicles." No. 13,641.
Justice, P. M.—"Obtaining motor fuels and light paraffin oils from shale, and benzene, toluene, and solvent naphtha from coal." No. 13,485.
Mantle Lamp Company.—"Hydrocarbon burners." No. 13,338.
Ogden, J. E. L.—"Corrosion-resisting valves or cocks." No. 13,288.
Oldham, R.—"Gas equipments for motor vehicles." No. 13,642.
Page, F. W.—"Valve or cock." No. 13,316.
Parsons, H.—"Gas-containers for motor vehicles, &c." No. 13,568.
Pease, E. L.—"Extraction of ammonia from gases." No. 13,560.
Pease, E. L.—"Extraction of ammonia from gases and vapours, and production of nitrogen compounds." No. 13,608.
Pirani, S. G.—See Justice. No. 13,485.
Russell, C. H.—See Gorman. No. 13,412.
Singleton, J. H.—See Fletcher, Russell, & Co. No. 13,583.
South Metropolitan Gas Company.—"Alkali-fusion of aromatic sulphonic acids." No. 13,314.
Swain, L. H.—"Container for motor vehicles." No. 13,424.
Ter Cock, C.—"Gas-receptacles." No. 13,552.
Topham, W.—"Regenerative gas-furnaces." No. 13,652.
Tozer, C. W.—See Easton. No. 13,312.
United Automobile Services, Ltd.—See Jolly. No. 13,641.
Whitehouse & Oldham.—See Oldham. No. 13,642.
Wilson, F. D.—See Gorman. No. 13,412.
Wilson, R. P.—"Projection apparatus for photometric comparison." No. 13,327.
Worrall, H. O.—"Gas-containers for motor vehicles." No. 13,269.
Yates, G. H.—See Devey. No. 13,444.

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Price of Gas for Motive Power at Smethwick.—The Smethwick Town Council have accepted the recommendation of the Gas Committee to increase the price of gas for motive power manufacturing purposes from 1s. 8d. per 1000 c.ft. to 2s. 2d. per 1000 c.ft. up to 3,000,000 c.ft. and 2s. for over this quantity.

Protected Trades Schedule.—At Bermondsey, attention has again been drawn to the indiscriminate granting of certificates under the protected trades schedule, when a man stated that he had received a certificate though no application was made for it either by his manager in London or himself. Mr. W. Shearring said the granting of the certificates in this indiscriminate way was most unfair to traders and large employers of labour, and also to the Tribunal, who were called upon to send married men with large families into the army. The Military Representative remarked that if a firm were on the Government list they automatically received protection cards for all their employees over nineteen years of age classified B1 (garrison duty abroad), or in the lower medical categories, no matter what the men did. The Tribunal decided to ask the Badges and Protected Trades Department to receive a deputation on the question. If no reply was received or satisfactory solution arrived at in the meantime, the Tribunal decided that they would suspend the hearing of all further applications for exemption.

Oldham and Unscreened Coal.—Reference was made to the use of unscreened coal at a meeting of the Oldham Gas Committee, when Mr. Tim Duxbury (the Gas Engineer) reported that the stock of coal was now 19,000 tons, against 29,000 tons a year ago. They finished up last winter with only 2000 tons. The reduced amount of gas made per ton of material used was due to the fact that the vertical retorts had been under repair, and nearly all the gas had been made in horizontal retorts, which yielded 2000 c.ft. less per ton. They also had a large amount of unscreened local coal against screened coal last year; and the difference again was nearly 2000 c.ft. per ton. For a fortnight they had worked on low temperature carbonizing as requested by the Government, which caused a reduction at the central works. They were now receiving very little delivery of screened coal. If they were receiving screened coal last year, according to the Coal Controller they should be getting screened coal this year. On Monday last the local contractors provided 8¼ tons of unscreened coal, against 8 tons of screened coal. It should be the other way about. They could not stock the unscreened coal; it had to be used for fear of fire. In pre-war times, they would not look at it. They got only 1s. per ton allowed as difference; whereas several tests which he had carefully made showed that they were losing at the rate of 3s. per ton by using unscreened coal.

STOCK MARKET REPORT.

Business on the Stock Exchange last week was moderately active, and the general tone, although at first uncertain while the terms of the new War Bonds were open to some amount of speculation, became firm when these became more fully revealed. They appear calculated to give satisfaction to all expectant investors, both large and small; being varied in their periods, their rates, and other characteristics, and having conversion rights into the bargain. The intelligence of Sir Douglas Haig's further successes on the Belgian front was naturally another cheering factor; so that the week closed at its best.

The gilt-edged market was not as much affected by the new Bonds as had been feared. The existing War Loans at low rates of interest were rather hit; but the 5 p.ct. and 4½ p.ct. closed firm. In Home Rails, prior charges were pretty steady, but ordinaries drooped for lack of support. Canadians were not strong; but Argentines made a little recovery, though the strike position remains perturbing. In Miscellaneous issues, Rubber, Oil, Textiles, and Munitions were irregular—some being sold to realize profits; but Breweries had a very good innings.

Business in the Gas Market was scarcely as active as in the week before; but it was not far short. Movements in price were for the most part very slight. The most conspicuous exception was Imperial Continental, which from 87 on Tuesday advanced by steady steps to a closing bargain at 92. South Suburban gained a point, and South Metropolitan and Continental Union were firm; but British Gas Light ordinary, and Southampton were a point easier. Primitivas had a reaction from recent buoyancy, and were quoted a little lower.

In the Money Market, there was a strong demand, and rates stiffened accordingly.

Bargains done for cash during the week were as follows: On Monday, Cape Town 60s., Gas Light ordinary 71, ditto maximum 57, ditto debenture 56¾, 56¼, 56½, 56⅞, Imperial Continental 87⅛, Primitiva preference 61s. 3d., ditto debenture 78⅛, 78⅝, 79, ditto debenture (1911) 59⅛, South Metropolitan 73, 73⅛, 73⅜, 74, ditto preference 95⅛, 95⅜, Southampton 76¼, Worthing 76, 76½. On Tuesday, Bournemouth "B" 10$\frac{31}{32}$, 10⅞, European 10⅜, Gas Light ordinary, 70, 70⅜, 71, ditto maximum 56, ditto preference 70½, ditto debenture 56¼, 56⅜, Imperial Continental 87, 87⅛, 87½, 88, Primitiva 42s. 6d., 45s., 46s. 2d., ditto preference 63s. 9d., South Metropolitan 73⅜, South Suburban 75, 75⅝, 76¼, ditto debenture 87. On Wednesday, Gas Light ordinary 69½, 70, 70⅜, ditto maximum 57½, 57¾, ditto preference 70½, ditto debenture 56¼, Gloucester 73, 73⅜, European 11⅛, Imperial Continental 88½, 88⅜, 89, Monte Video 7½, 8, Primitiva preference 60s., 61s. 3d. On Thursday, Bournemouth "B" 10$\frac{15}{16}$. Continental Union 39½, Gas Light ordinary 69, 69⅛, 70⅛, ditto preference 71, ditto debenture 56½, Imperial Continental 89, 90, 90½, 91, Newcastle 71⅜, Primitiva 45s. 9d., ditto preference 60s., 61s. 10½d., South Metropolitan 73. On Friday, Bournemouth "B" 10$\frac{15}{16}$. Bristol 83⅜, Continental Union 40⅛, European 11, Gas Light ordinary 69, 69⅛, ditto maximum 57⅛, ditto preference 70⅛, 71, 71⅛, Imperial Continental 90, 90¼, 90⅜, 91, 92, Primitiva preference 61s. 10½d., South Metropolitan preference 95⅛, South Suburban 75, ditto preference 75½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When due Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	48—53*	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7⅛	4/6	Bombay, Ltd.	5⅞—6⅛	5—5½	..
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water (10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.)	29—30	23—25	..
383,110	10	,,	7	7%		15—15½	10½—11	10$\frac{11}{16}$—10$\frac{15}{16}$
115,000	10	,,	6	6/-		13½—14	9—9½	..
159,740	—	—	—	4%		..	69—71	..
992,045	Stk.	Feb. 26	14	5½%	Brentford A Consolid.	261—266	79—82	..
734,920	,,	,,	11	4½%	Do. B New	204—209	76—79	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	145—150	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—103	..
530,000	20	Mar. 26	12½	22/6	British	44—45	32—33	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1⅞—2⅛	3—3⅛	60/-
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6⅛—7⅛	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	..
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69⅛—71⅛	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39½—40½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17⅛—18	10½—11½	10⅞—11⅛
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light & Coke (4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds)	98—102	69—71	69—71
2,600,000	,,	,,	3½	3½%		76—79	56—58	56—57⅜
4,062,235	,,	,,	4	4%		96—99	70—72	70⅛—71½
4,674,850	,,	June 11	3	3%		72½—74½	55—57	56⅛—56⅝
130,000	,,	,,	10	10%		..	..	..
258,740	,,	Mar. 12	5	3⅛%	Hastings & St. L. 3½ p.c.	87—89	48—53	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7⅛—8⅛	..
26,600	—	—	—	9%	Hornsey 7 p.c.	..	115—125	..
131,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	92—97	..
65,780	,,	,,	6⅔	5⅞%	Do. B	115—118	72—77	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	89—92	87—92
1,235,000	,,	Feb. 12	3½	3⅜%	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	,,	Mar. 12	6½	6⅛%	Lea Bridge Ord. 5 p.c.	119—121	82—87	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. (A / B)	211—213 / 146—148	81—83	..
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅞—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛—12	7⅛—8	7⅛—8
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	71⅛—72	71⅞
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9⅜—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	73—78	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	2⅛—2⅜	42/6—46,2
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅞—5	3—3½	60/—63/9
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	78½—79
—	—	—	—	4%	Do. ,, ,, 1911	..	..	59¼
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref. 5 p.c. Deb.)	10½—11	7⅛—8*	..
135,000	50	July 1	5	5%		47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	180—184	..
209,984	,,	,,	10	10%	Do. B	223—224		
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African	10⅛—11⅛	8⅛—9⅛	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74	73—74
—	—	—	—	—	Do. Pref.	—	—	95⅛—95⅞
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72⅛—74⅛	55—57	..
224,820	,,	Feb. 26	8⅓	7⅛%	South Shields Con. Stk.	157—159	137—139	..
952,795	,,	,,	6	4⅜%	S'th Suburb'n Ord. 5 p.c.	114—116	75—77	75—76¼
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	75⅛
135,000	—	—	—	4⅝%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	87
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	75—77	76⅛
120,000	,,	Feb. 12	7⅛	5⅜%	Tottenham District (A 5 p.c. B 3½ p.c. 4 p.c. Deb.)	135—138	92—97	..
782,275	,,	,,	6	4%		115—117	66—71	..
181,255	,,	June 26	4	4%		87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			..
30,000	,,	Feb. 26	8⅔	72/6	Wandsworth A 5 p.c.	151—156	112—117	..
255,636	,,	,,	6⅔	57/6	Do. B 3½ p.c.	129—134	97—99	..
108,075	,,	,,	5/17/3	50/9	Do. C 3½ p.c.	110—115	84—89	..
352,000	,,	,,	6⅔	51/9	Wimbledon 5 p.c.	117—122	85—90	..
98,000	,,	,,	6⅔	57/6	Epsom 5 p.c.	121—126	93—98	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex Div.

Price of Gas at Alfreton.—The Directors of the Alfreton Gas Company have issued a notice stating that they have decided to increase the price of gas 3d. per 1000 c.ft. They raised the price two years ago 6d.; and with the additional advance the charge to the public will be 4s. 7d. per 1000 c.ft.

Street Lighting at Padiham.—The question of street lighting gave rise to an animated discussion at a meeting of the Padiham District Council. Mr. A. J. Harrison (the Gas Engineer) replied to members that they could not have any more lamps lighted without making representations to the police. The number of lamps allowed to the town was 127. It was pointed out that people, when comparing Padiham with Burnley, forgot that at Burnley they were able to turn out the lights at once in case of alarm. Mr. Wiggins said their own Lighting Committee knew better than a stranger where lamps were needed. He was for lighting lamps where they were wanted, in spite of the police. There was nothing more depressing than going about dark streets; and people were being restricted enough in other directions without this. Mr. Harrison said that, if they had not had the automatic system of turning-out lights, a smaller number would have been allowed them.

Shipley Gas Complaints.—Further reference was made at the Shipley Urban District Council meeting last week, to the investigations by the Gas Committee into the matter of complaints of mysteriously increased consumption records on the household meters. It was stated that generally there were satisfactory explanations. In some cases there would have to be allowances in respect of defective meters; but they were comparatively few.

The Chelmsford Town Council have received applications from two firms owning large motor vehicles for supplies of gas for driving their engines. They have duly considered the question; and it is suggested that the charge for all gas supplied for this purpose should be at the rate of 5s. per 1000 c.ft.

An application has been received by the West Bromwich Town Council from the Amalgamated Society of Gas, Municipal, and General Workers for an increase of wages; and on the recommendation of the General Purposes Committee it was decided to grant, as from Aug. 1, a further increase of 3s. a week for men, and 1s. 6d. for youths and apprentices under 18—the increase to be deemed a war wage.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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